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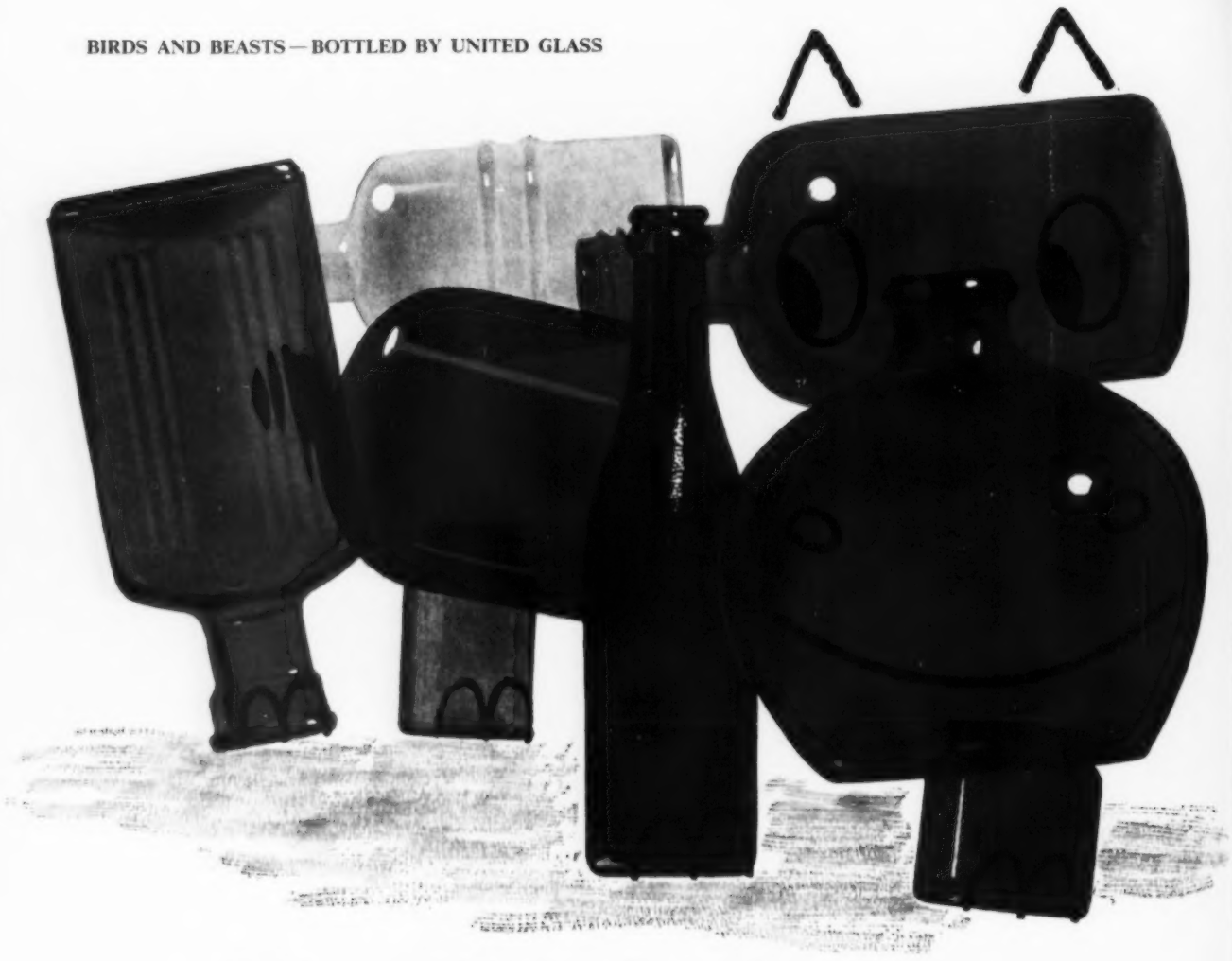

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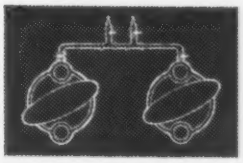

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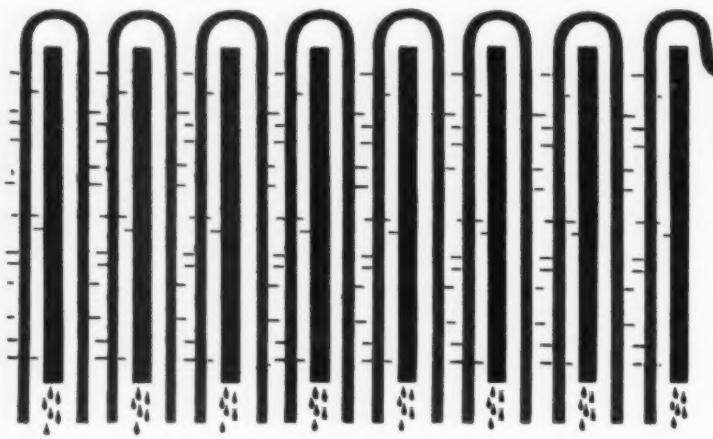

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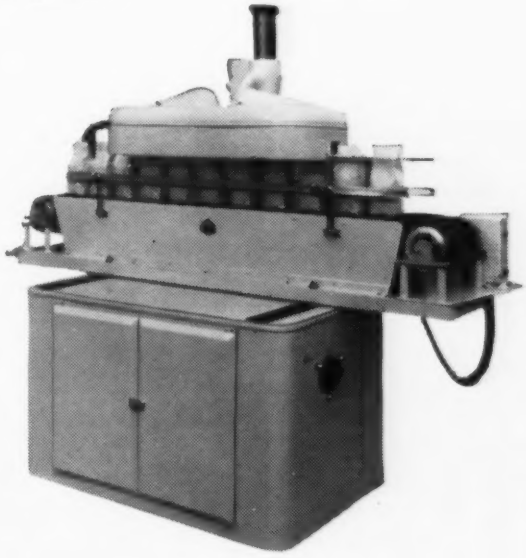

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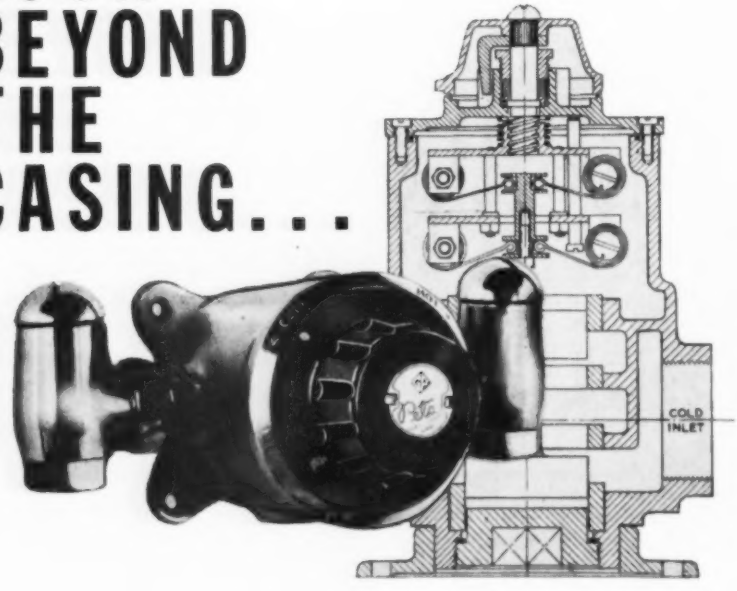

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2. CONTAINER IN USE TESTING

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3. SHELF TESTING SERVICE

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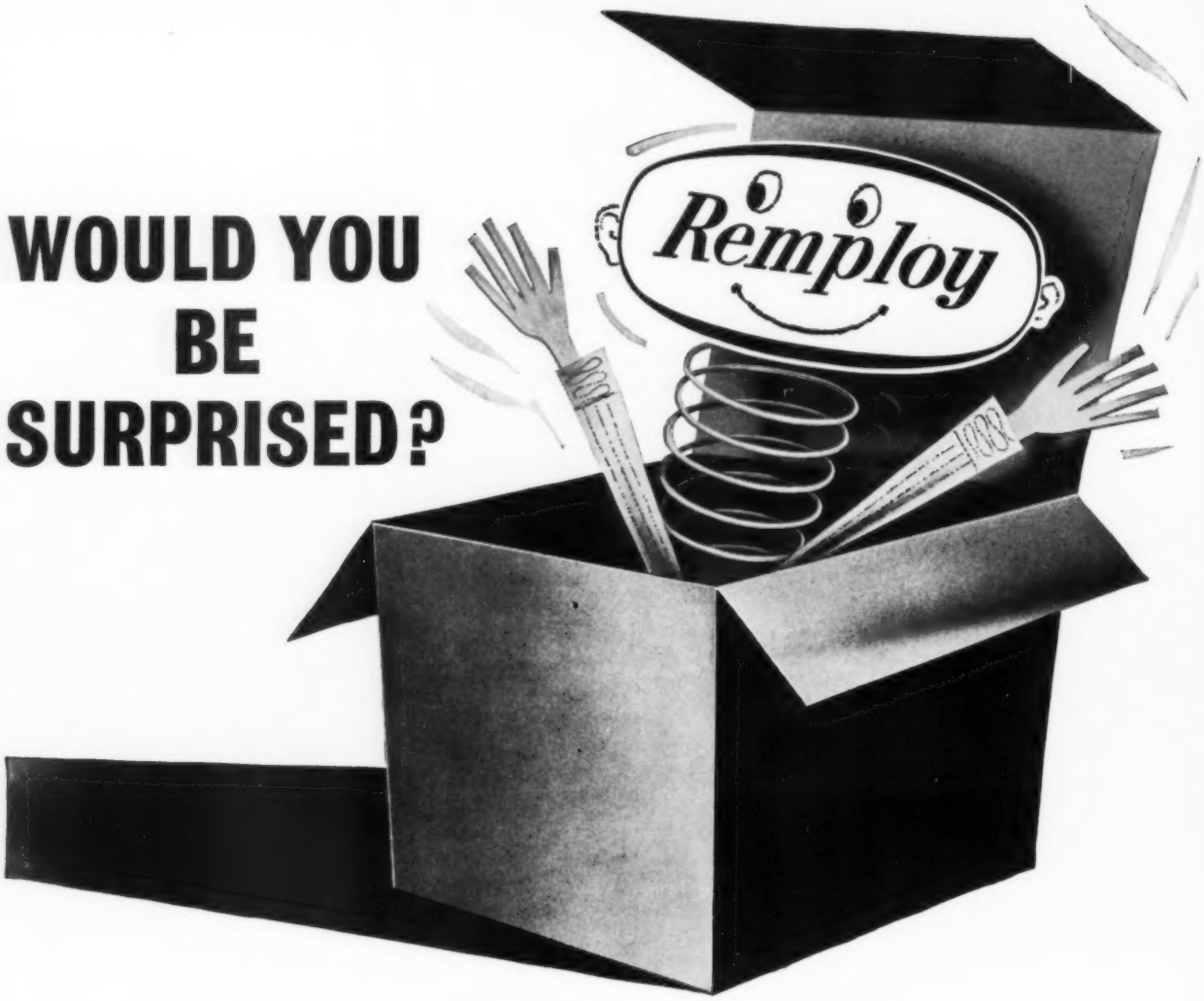

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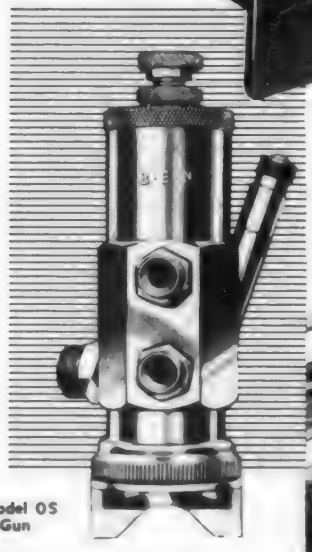
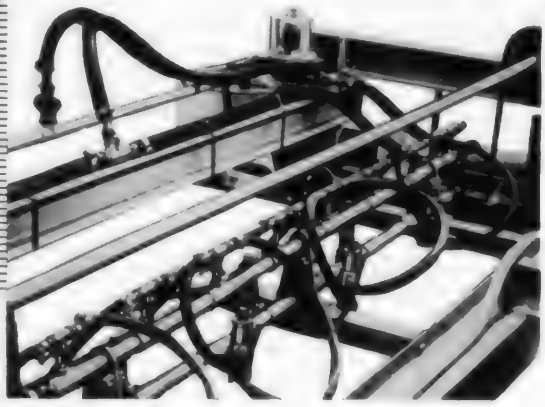


B.E.N. Model OS Spray Gun



The B.E.N. OS Spray Gun is specifically designed for use where intermittent or synchronised spray coatings are required for materials being handled by conveyors or other mechanical means. Write for Leaflet CB.164.

B·E·N DRY CYLINDER CARBON RING

SINGLE STAGE AIR COMPRESSORS

B.E.N. PATENTS LTD. (Division of BROOM & WADE LTD.,) Dept. F.3., HIGH WYCOMBE, BUCKS.

361

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Rapid pea/bean filling made clean splashless by new auto machine

Type 1FF 10-head Automatic Pea/Bean Filling Machine.

This new Kellie model

fills half the liquid, then the solids, finally the other half of the liquid. Air does not trap in the cans nor liquid overflow. Up to 180 cans per minute, in all sizes up to A2½. Self contained motor as illustrated or synchronised drive from the Double Seamer.

KELLIE

KELLIE for FOOD PLANT

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Telegraphic and Cable Address: "KELLIE," DUNDEE, Code A.B.C.(5th Edn.)

WHAT MOVES THE GOODS?

A product is on its way to the shopping-basket.

Why?

Why did this housewife choose doughnuts, why this particular brand? What is the sales-impelling quality that this product possesses?

It is on the answers to questions like these that your sales success may depend.

Critical factors in moving goods into the shopping basket are correct choice of wrapping materials and good package design — in many cases this means using transparent film which protects goods fully, displays them at their best, lets the shopper examine them thoroughly. These are matters our Package Design Section can advise you about. They will willingly devise a package that makes the most of your product, evolve an efficient wrapping technique.

The service we offer is unique in this country. Besides our Package Design Section, a staff of engineers is always available to give you technical assistance with machines; you can call on our chemists and physicists at any time to conduct full-scale packaging tests with your product.

If you need assistance or advice on any aspect of transparent film packaging, we are waiting to help you. Contact us today.

BCL

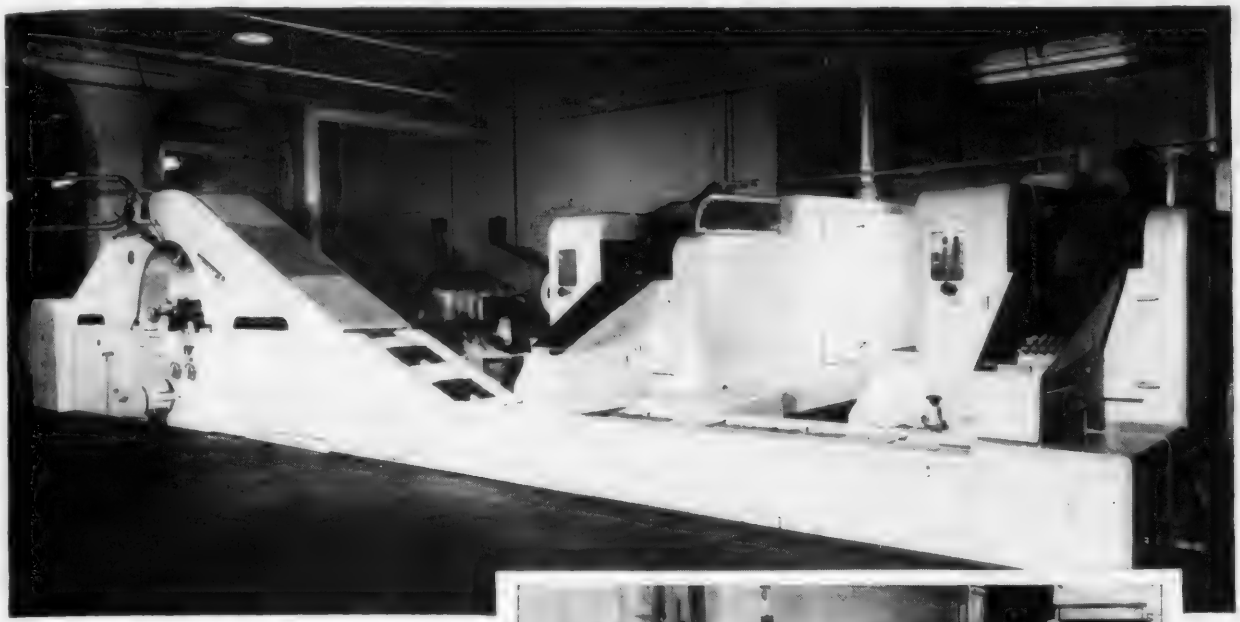
BRITISH CELLOPHANE LIMITED

Henrietta House, 9 Henrietta Place,
London, W.1.

"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them.

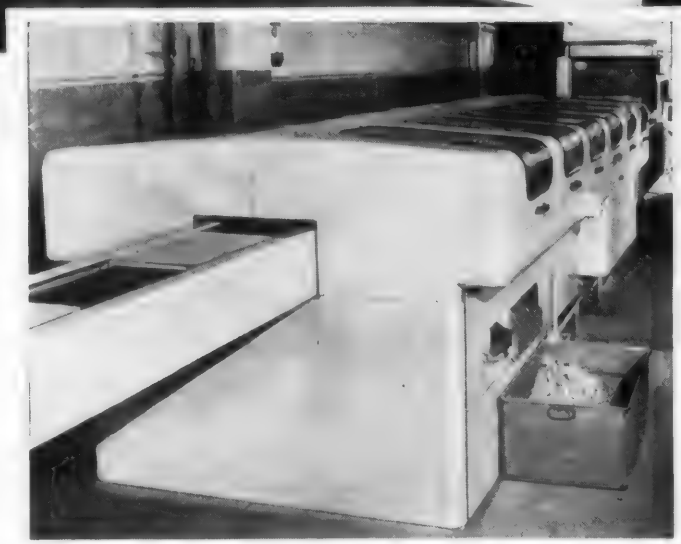
Mechanise your WAFER production

(and incorporate existing wafer ovens if necessary)



Two 24-plate ovens (right) feeding by conveyor to spreading and sandwiching machine (left).

This Baker Perkins Automatic Wafer Plant incorporates two 24-plate wafer baking machines—one of the best-known units in the biscuit industry. If you already have 24-plate ovens (of the latest type with automatic discharge), the new Baker Perkins wafer system can be added. Completely automatic, it includes a method of taking the wafers from the ovens, conveying, spreading, sandwiching, cooling, cutting, separating and batching. It could also include enrobing, chocolate cooling and wrapping.



Machine for cutting large wafer blocks into small biscuits. Because automatic layering gives perfect regularity of block, cutting is to fine limits and scrap is saved. Cutter also separates, batches and feeds automatically to enrober.

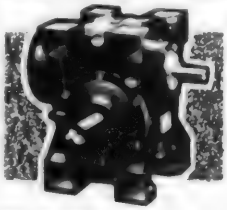
Photos by kind permission of Gray Dunn & Co Ltd, Glasgow, whose new automatic wafer plant extends from ovens right through to Flowpak wrapping

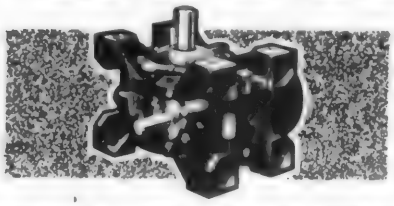
Please write for further details . . . . . . **Baker Perkins Ltd**

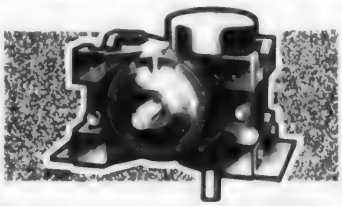
Westwood Works, Peterborough.

BP 854

NOW! CROFTS PAR-O-MOUNT UNIVERSAL WORM GEARS WITH UP TO 50 MOUNTING POSITIONS







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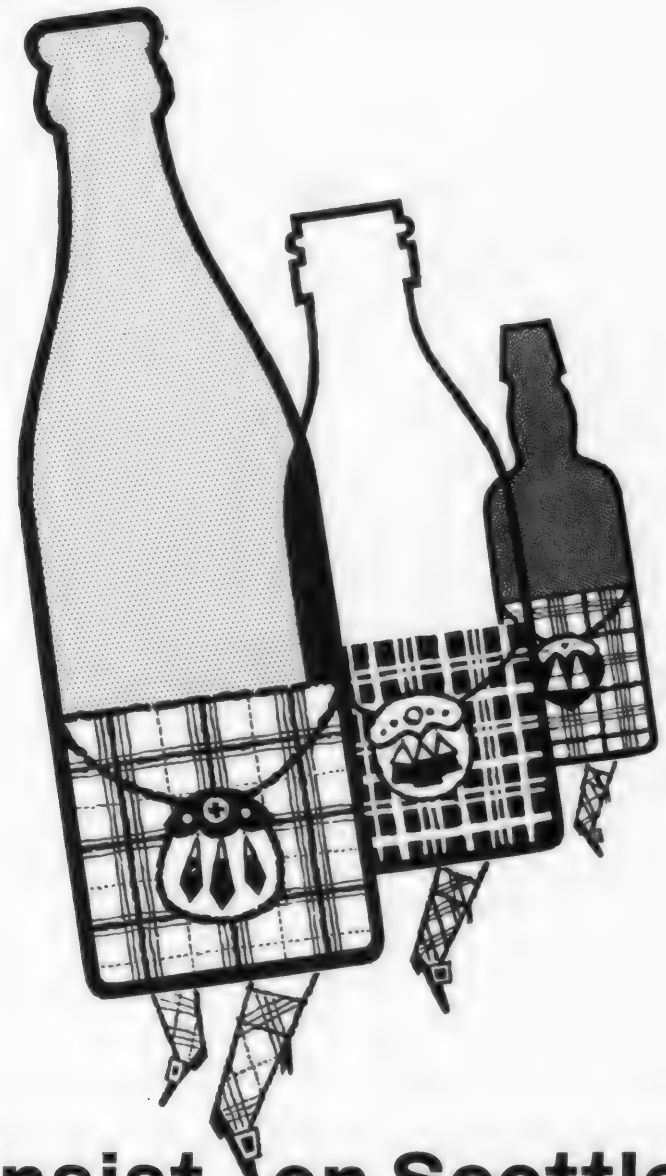
POWER TRANSMISSION ENGINEERS

THORNBURY, BRADFORD 3, YORKSHIRE World-wide representation



I insist on Scottles!

I'm a Scot and I know what's what. I put my products in Scottles. Yes, Scottles—bottles made in Scotland by Alloa Glass Limited. It's not just that the bottles are good. The service is first class, too. Prompt, helpful, thorough and on the spot for the Scot.

Everything you need in glass packaging right in the heart of Scotland. That's what Alloa Glass offers. You get individual attention, the best in research and design, and Alloa Glass has an associated closure company in Scotland, too. If you'd like this kind of service, please get in touch.

ALLOA GLASS

Alloa Glass Limited, Glasshouse Loan, Alloa, Scotland. Telephone: Alloa 761

Why FILTRATION = NYLON

Today, more filtering with nylon cloth is carried out in Britain than anywhere else in the world. But if you operate a filtration process and do not already use nylon, you may like to know some of the reasons why nylon cloths so quickly established themselves:—

LONG LIFE—Nylon filter cloths have much greater life expectancy because of nylon's excellent tensile and rupture strength, wet and dry; its superb abrasion resistance; its resistance to chemical attack and extremes of temperature, and its immunity to attack by mildew and fungi.

ADAPTABILITY—Nylon cloths are supplied in all weights and weaves. There is a choice of surface characteristics, including smooth surfaced cloths for easy cake discharge.

BETTER SERVICE—Nylon cloths have excellent filtering properties, do not shed surface fibre. They can be cleaned quickly and easily. Cloth stability is very good.

LOWER COSTS—All the advantages listed above mean that nylon filter cloths can give you a substantial cut in costs. By making filtration processes simpler, they can increase production.

IT'S *Nylon* FOR STRENGTH

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B Nylon S

THE PACK THAT MADE A CUSTOMER

Research has shown that 7 out of 10 purchases in supermarkets are decided upon after the customer comes into the store.

Eye-appeal is undoubtedly a very important factor contributing to impulse buying.

*

Sidac transparent cellulose film adds glamour and gives protection to a multitude of products. It is produced clear or coloured, plain or printed, in sheet, roll or bag form, in types to suit practically all packaging needs.

MCN1088

The Sidac Design and Technical Service is at the disposal of all who are interested in better packaging. You are invited to make full use of our facilities.

BRITISH SIDAC LIMITED

Manufacturers and Converters of Transparent Cellulose Film

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PACK WITH SIDAC

BHT
complies with the requirements of the Food and Drugs Act 1955, and the Foods and Drugs (Scotland) Act 1956.
SPECIFICATION: CRYSTALLISING POINT NOT LESS THAN 69.4°C
LEAD NOT MORE THAN 10 PPM
ARSENIC NOT MORE THAN 2 PPM
I.C.I. (Heavy Organic Chemicals) Limited, Billingham England.

'TOPANOL' BHT – a new food antioxidant

The *Antioxidant in Food Regulations, 1958*, permit the use of butylated hydroxytoluene in a variety of foods: 'Topanol' BHT is prepared with great care specially for this purpose.

'Topanol' BHT conforms with the requirements of the *Food Hygiene Regulations, 1955*, and other relevant legislation under the *Food and Drugs Act, 1955*.

'Topanol' BHT meets the following specification:—

Crystallising point	—	*not less than* 69.4 °C.
Lead	—	*not more than* 10 p.p.m.
Arsenic	—	*not more than* 2 p.p.m.

Animal and vegetable oils and fats, and baked and fried foods containing these, are protected from rancidity at concentrations as low as 0.01% by weight—cooking temperatures do not destroy activity.

Paper and paper board wrapping impregnated with 'Topanol' BHT at low concentrations keep foods fresher by retarding rancidity at packaged food surfaces and on migrated films of fat.

The appetising appearance of food packs can be maintained by the use of plastic film wrappings (e.g. polythene) colour-stabilised and protected against embrittlement.

Natural and synthetic oil-soluble vitamins (e.g. in fish liver oils) and citrus and other essential oils are also the better for 'Topanol' BHT.

A PRODUCT OF

I.C.I. HEAVY ORGANIC CHEMICALS DIVISION

Full information on request

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LONDON, S.W.1.

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it benefits in three important ways

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Aluminium Foil, by itself or laminated with other materials, is tailor-made to provide the perfect wrapping for your product.

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Get all the advantages of brilliant colour and clear crisp printing that is produced by Fisher's photogravure plant—one of the finest in the World. New designs? Let our creative team tackle them. They have that rare combination of experience and imagination that produces ideas which are original and practical.

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Sit back and relax, and let Fisher's Technical Staff worry about your packaging problems. They'll give you really informed opinions.

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EXHIBITION GROUNDS, WEMBLEY, MIDDLESEX, ENGLAND. TELEPHONE: WEMBLEY 6011. GRAMS: LIOFNIT WEMBLEY.

add the true flavour
ORANGE
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Help yourself *and* the housewife by choosing an attractive, hermetic R.O. Seal for your pack. Automatically applied, the R.O. Seal protects and preserves your product until it reaches the ultimate consumer.

tailor made to fit individual bottles and jars.

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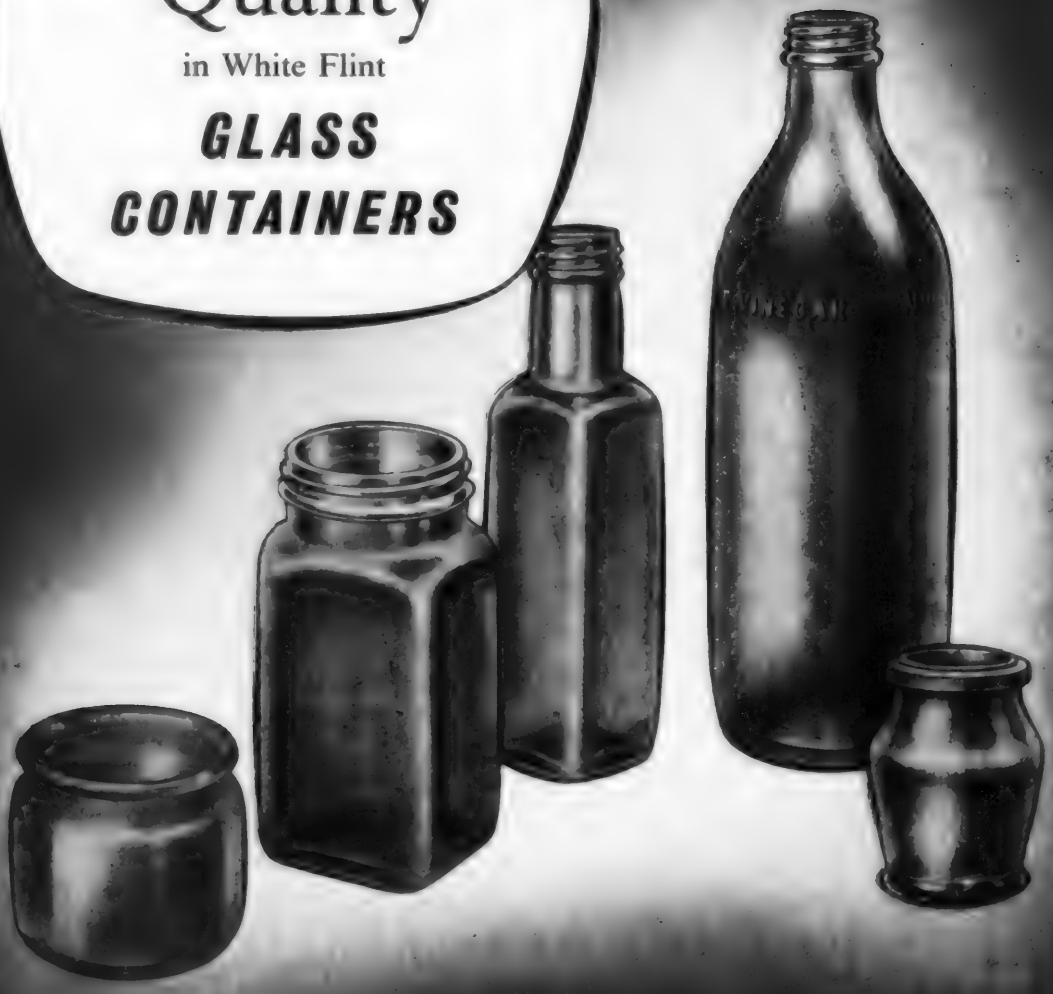
in White Flint

GLASS CONTAINERS



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P&S FLAVOURS are much better!

GREENGAGE E.M.
22/6 per lb.

High Boilings 2 fl. ozs. per cwt.

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A full fruity flavour with character.

Samples on request.

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Versatility

BEER IN CANS... another new use for tinplate

Tinplate is changing the traditionally conservative habits of beer-drinkers. Already in Britain leading brewers are packing no fewer than one hundred and eighteen brands of beer in cans.

Research and development by The Steel Company of Wales have helped to make possible this further example of tinplate's increasing versatility. In addition to the special type of tinplate required for canning beer, The Steel Company of Wales produces a wide variety of grades and qualities to suit many specialized applications.

We make a great deal of Britain's tinplate, and we are constantly learning something new about it. There are several interesting recent developments. Why not write to us?

TINPLATE DIVISION

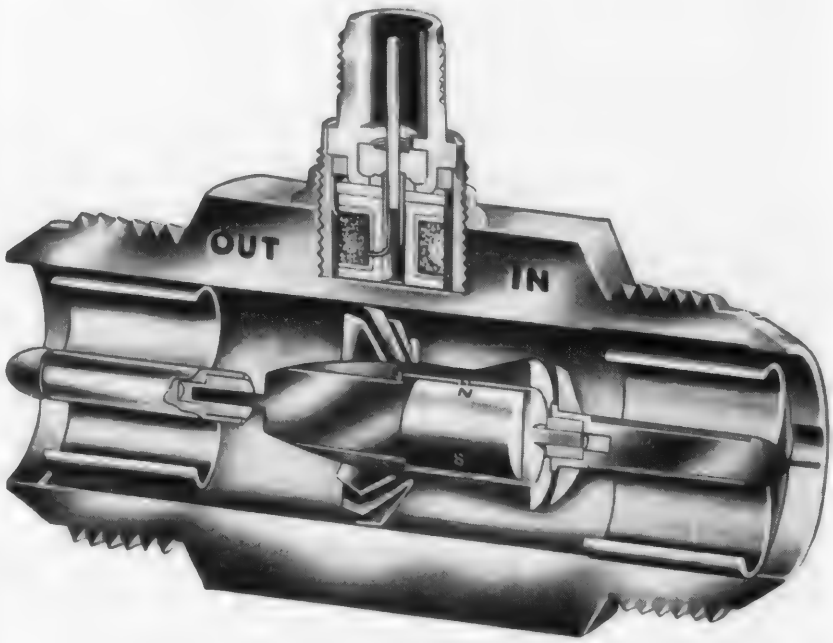
THE STEEL COMPANY OF WALES LIMITED

Carmarthen Road, Swansea, Glamorgan Telephone : Swansea 3157[illegible] Telegrams : Welshplate, Swansea

Wherever information on fluid flow is required,

the de Havilland POTTERMETER

sets new standards of accuracy and reliability



This new turbine-type flowmeter enables major advances to be made in the techniques of flow measurement and control. The de Havilland Pottermeter is the only flowmeter which offers all these features:

Manufactured as standard in stainless steel—special sanitary model contains no glands or crevices where bacteria can collect—designed to be cleaned in place.

Accuracy to ± 0·1% or better on repetition work, ± 0·5% or better over a 20:1 range. Calibration remains constant for a variety of liquids over wide flow ranges.

Contains only one moving part—no thrust bearings—demands a minimum of maintenance.

No larger than the pipeline in which it is installed—may be mounted in any attitude.

Can be supplied with indicating, recording and process control equipment— gives digital presentation of results.

Can measure volumetric or mass flows.

Models available to measure flows from 0·1 to 40,000 Imperial gallons per minute, at a wide range of operating pressures. Larger and smaller sizes made to order.

Can measure flow of any liquid or gas, irrespective of its lubricating or non-lubricating properties.

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DE HAVILLAND PROPELLERS LIMITED

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and given you stackability

Yes indeed!–a rounded square container, not all round and not all square but an ideal compromise offering plenty of advantages.
First, a container of great strength; second, an easy-to-grip container with 'stackability'. Just imagine a container for your products with the maximum display potential–sideways, front and back and upwards.
More of your products on the retailers' shelves and better displays with perfect label alignment to tempt the consumer.
Get on to JACKSON GLASS now
and see how 'stackability' can go to work for you.

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A comprehensive service embracing design and advice on glass containers, closures, labelling, display boxes and outers. This service also offers free market research facilities on 'design preference testing', 'container-in-use testing', and 'shelf testing', as well as an area test marketing service at a nominal charge. Ring Museum 7263 with any problem you may have or write for informative booklet.

Jackson research unit
A team of experts, perfecting new types of glass packs and closures. If you have a new product or want to give a new look to an existing one, we may already have the answer for you.

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BUILT with your needs in mind, the Commer 1½ ton forward control model thrives on the toughest assignments . . . triumphs magnificently over the fierce strain of "stop-start" delivery work. A sterling example of Commer reliability, this lively four-cylinder model is quality engineered and gives the utmost economy of operation. Primarily fitted with van bodywork distinctively modern in style, the chassis also accommodates special bodies to suit individual requirements such as the above.

Built stronger to last longer!

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A THOUGHT FOR FOODS

Protein additions?

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GIVE US FOOD FOR THOUGHT!

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CEDARS FACTORY STOWMARKET SUFFOLK

Maltsters for more than a Century

Butterfield ROAD TANKS

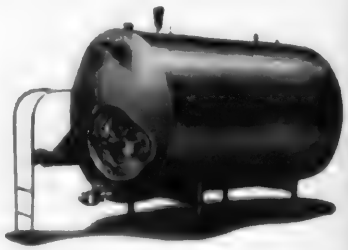
Butterfield Road Tanks supplied to many leading Food Distributors are insulated as required to maintain their bulk liquid contents at the correct temperature. Fabricated in Stainless Steel, Mild Steel, Aluminium or Nickel, these Road Tanks provide a good investment in safe, economical transport for liquid foodstuffs.

Our larger illustration above shows a 2,400 gallon Liquid Chocolate Transport Tank, fabricated from 18 8 Ti Stainless Steel. The tank shell and ends are covered with electric heating blankets and encased in 4" thick Fibreglass insulation with an outer casing of 18 gauge aluminium sheets. The 3" outlet cock is also fitted with a heating blanket. The tank is designed for pressure discharge at 25 lb. p.s.i. and tested to 50 lb. p.s.i. Mounted on Leyland Octopus.

fabricated in Stainless Steel Mild Steel, Aluminium & Nickel

Our smaller illustration shows a 1,000 gallon Cream Storage Tank.

Butterfields of SHIPLEY



Butterfields also fabricate TANKS VATS, VESSELS, etc. for the hygienic storage and handling of liquid foodstuffs, to Plant Engineer's specifications.

WELD X-RAY

Butterfields are equipped with Weld X-Ray plant, materials testing, metallurgical, chemical and microscopic examination laboratories, for any required class of work.

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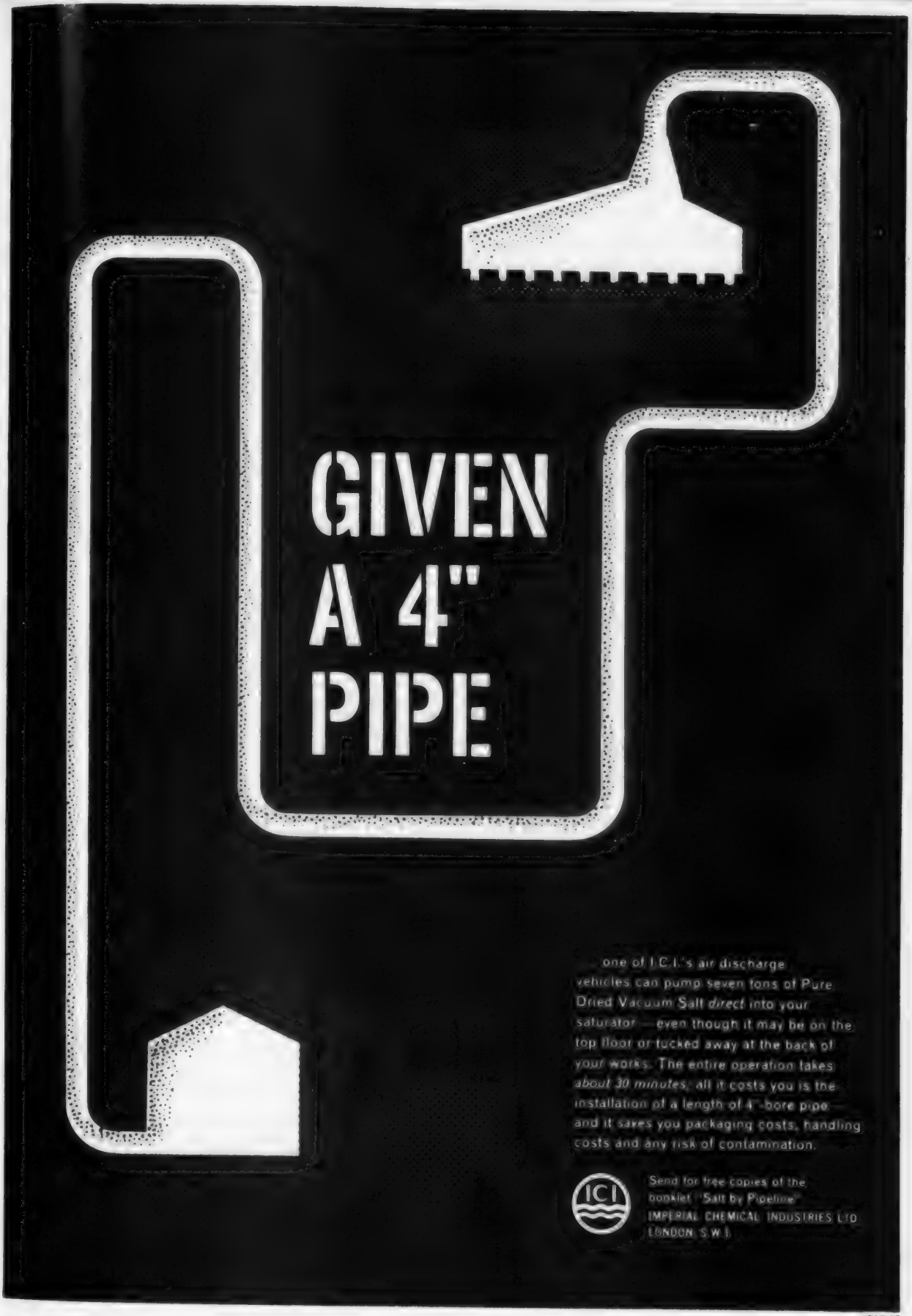
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A 4"
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one of I.C.I.'s air discharge vehicles can pump seven tons of Pure Dried Vacuum Salt *direct* into your saturator — even though it may be on the top floor or tucked away at the back of your works. The entire operation takes *about 30 minutes*; all it costs you is the installation of a length of 4"-bore pipe — and it saves you packaging costs, handling costs and any risk of contamination.
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DESIGNING

AND MAKING F.H.P. MOTORS

Something important has been obscured by the success of the mathematical approach to design – that engineering is an art as well as a science. Not everything can be worked out: beyond a certain point – particularly on detail – the designer has to trust his eye, his feeling for a sound job or his imagination. But these, in turn, depend on experience, not his alone; the common stock of the people he works with. This is the art; and it is the channel through which the accumulated experience of an engineering firm is fed back into new products.

The details in which it shows up sometimes seem trivial in themselves, but in aggregate they are important. A very simple example is the terminal box on our new F.H.P. motors. It is unusually large and the terminals are far bigger than the current that they carry would require. As a result, the motor is exceptionally quick and easy to connect up. Why, then, do not all small motors have large terminal boxes? Well, room has to be found on a small end-cover for a thermatrip, a bearing with a generous oil well and ventilation openings. Our designers have fitted them all in so successfully that there appears to have been no problem. It looks simpler than it is . . . which is often the way with good design.

Crompton Parkinson

Makers of Electric Motors of all kinds, A.C. and D.C. Generators, B.E.T. Transformers, Switchgear, Cables, Instruments, Lamps, Lighting Equipment, Batteries, Stud Welding Equipment, Traction Equipment, Ceiling Fans.

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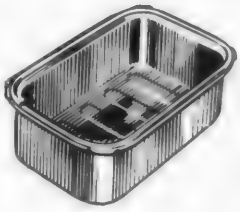
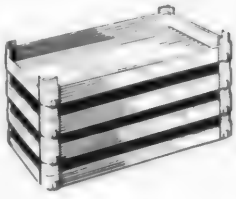
HYGIENE puts YOU on OUR metal!

ALUMINIUM
Stacking Containers





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Cat. No. C S. 24159—23½" × 14¼" × 9½"
C S. 24157—23½" × 14¼" × 7¾"
C S. 24155—23½" × 14¼" × 5½"
C S. 24153—23½" × 14¼" × 3½"

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- ★ Exceptionally strong rim obviating handles
- ★ Positive stacking by extra deep swage
- ★ Available with or without base drainage holes
- ★ Larger sizes in 16 gauge, smaller sizes in 18 gauge Aluminium Alloy
- ★ Lids also available, common to all sizes
- ★ All sizes will interstack

WARWICK 'WARCO' Reg. Trade Mark ENGLAND
First Choice for Aluminium Equipment

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LEEK FLAKES
HORSERADISH POWDER
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of unsurpassed quality

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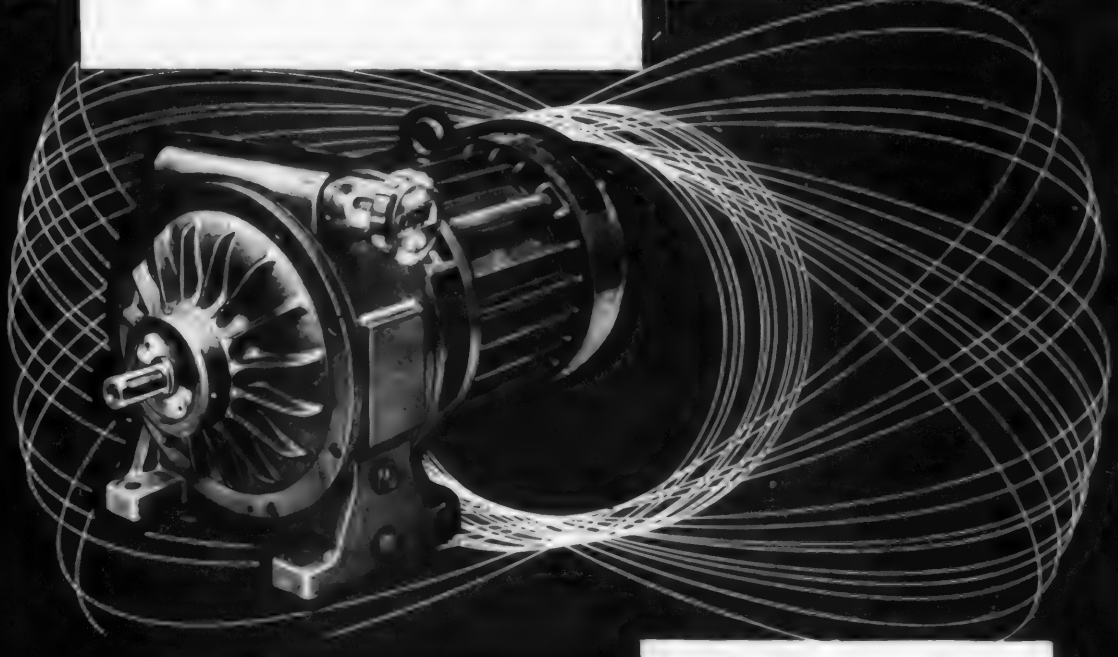
- Range 1/33 h.p. to 15 h.p.
- 9 to 1 stepless speed variation.
- Constant power transmission.
- Flange mounted motors (when required)
- Flange mounted Reduction Gears for low output speeds.
- Exceptionally light, sensitive and accurate control of speed settings by handwheel, pneumatic, mechanical or electrical remote control.
- Service reliability resulting from a simple design.
- Compact, vibrationless and silent.

Type M. 5 h.p. Variator with flange mounted motor.

A GEARLESS GEARBOX



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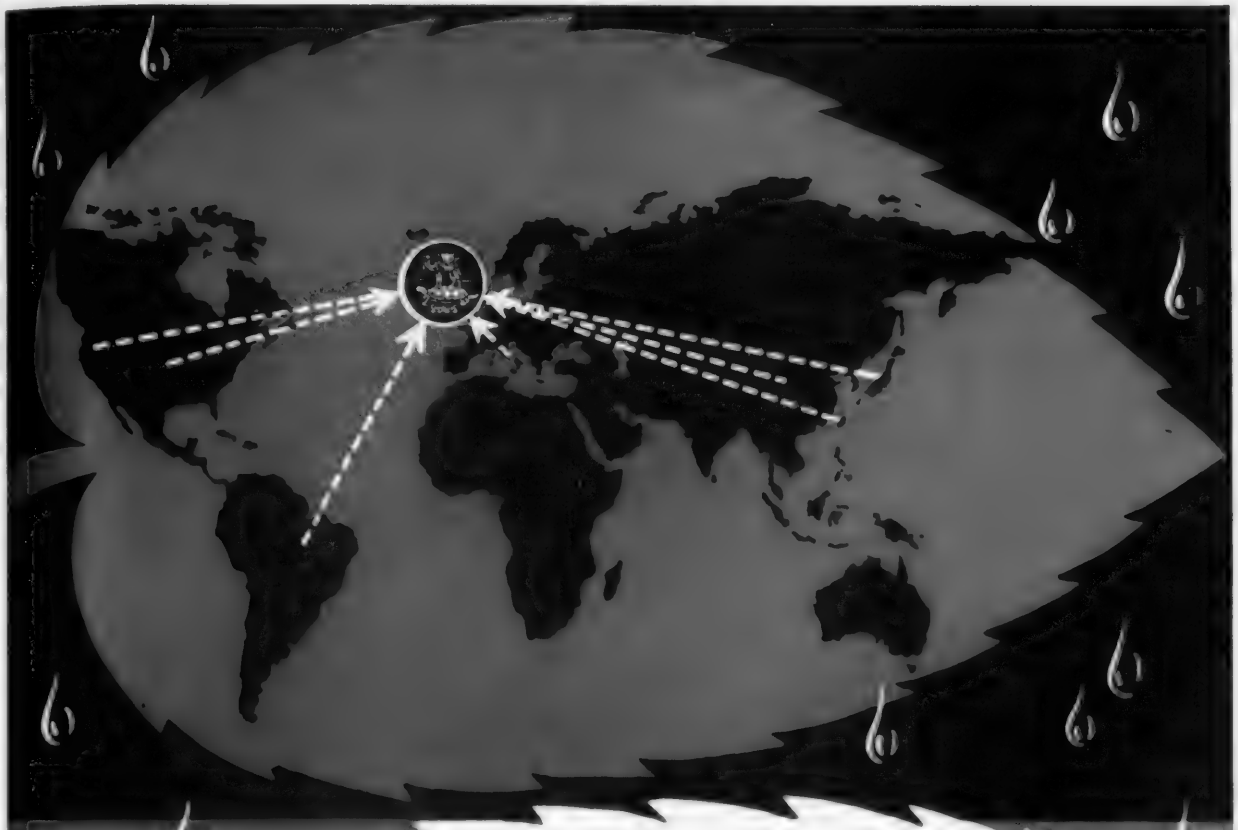
- ✳ You can clear insect pests right off your premises with "Pybuthrin", the powerful, non-poisonous insecticides which can be used without fear of tainting foodstuffs.
- ✳ Flour Beetle, Cacao Moth and similar pests are quickly and safely destroyed.
- ✳ "Pybuthrin" Insecticides are remarkably effective because they contain pyrethrins synergised with piperonyl butoxide.
- ✳ Whatever your pest problem Cooper's have the answer to it in the "Pybuthrin" range.
- ✳ We invite you to write for the informative booklet "Pybuthrin Non-Poisonous Insecticides" and to make full use of the Cooper Advisory Service, which is free.

CPH'DDC 1

COOPER, McDOUGALL & ROBERTSON LTD., BERKHAMSTED, HERTS. EST. 1843

PEPPERMINT OILS

you can trust



Everyone wants Peppermint. This popularity has resulted in the production of Peppermint Oils in many parts of the world. These oils differ widely and, although each has its uses, the greatest care should be taken in selecting the correct oil for a particular flavouring effect.

StaffordAllenS are one of the oldest and largest suppliers of Peppermint Oils in this country and have direct contracts with all major supply centres. For Peppermint Oils of unequalled quality, oils that you can trust, consult StaffordAllenS.

StaffordAllenS

TAS AL.661

see us for dust

For over 40 years we've been putting industrial dust safely out of the way before it can harm men or machines. In that time we've made a number of major contributions in our field—the development of the unit dust collector, for instance. We've made tens of thousands of them. Here is one of the very latest range . . .

DALLOW LAMBERT

Meet the new **DALLOW LAMBERT**

Unimaster

It's the finest dust control unit in the world. It's compact, powerful and made in a range of sizes —70 to 250 sq. ft. of filter area. Fans, filters and dust containers are made in a range of interchangeable sizes, giving a tremendous flexibility of application.

Finally—NO MORE HAND SHAKING!

Every Unimaster incorporates our new 'push button' filter cleaning method.

Whatever your industry you ought to know more about the UNIMASTER. Write or phone for further information.

DALLOW LAMBERT & CO. LTD., THURMASTON, LEICESTER. TELEPHONE: SYSTON 3333 (7 LINES)

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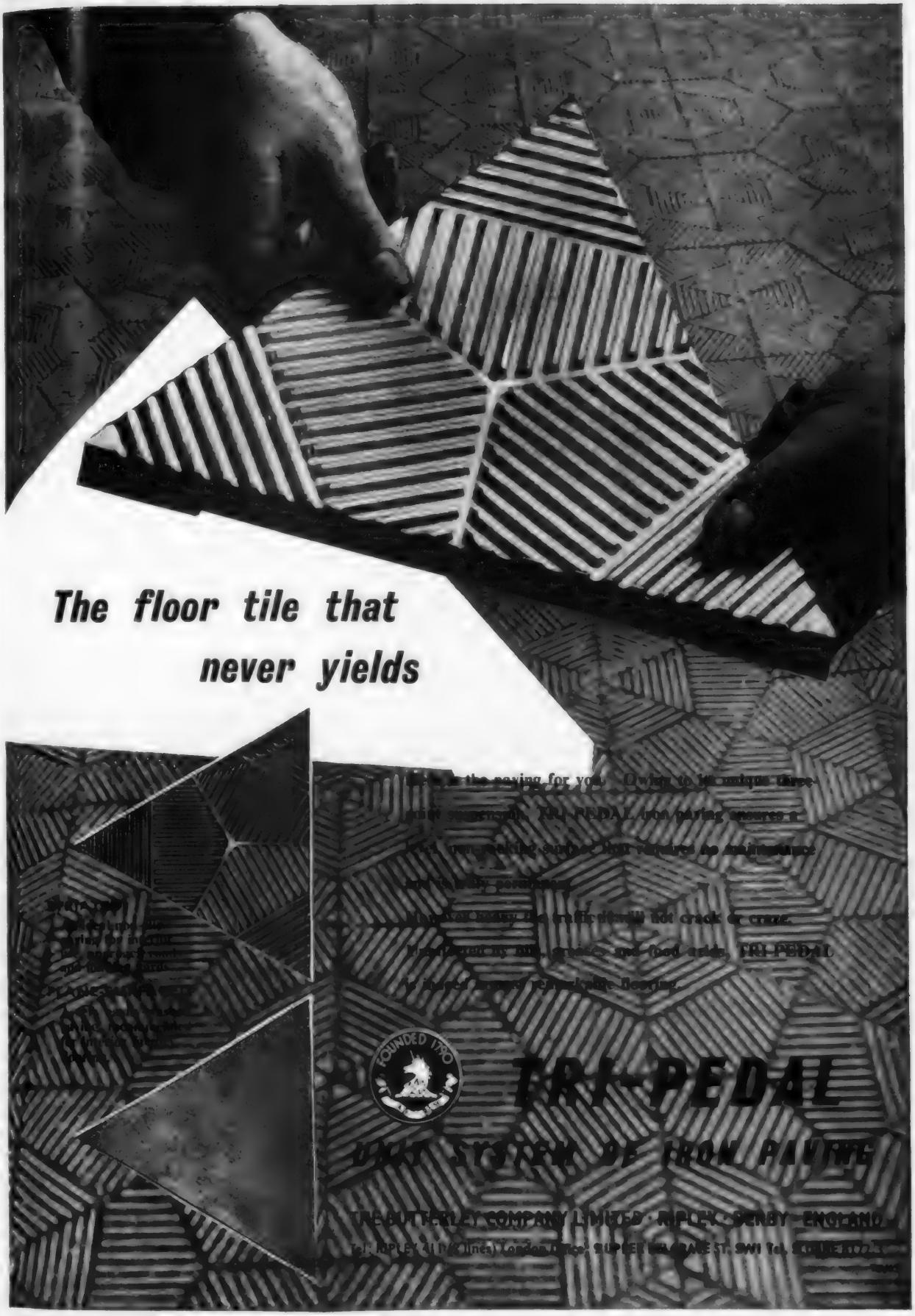
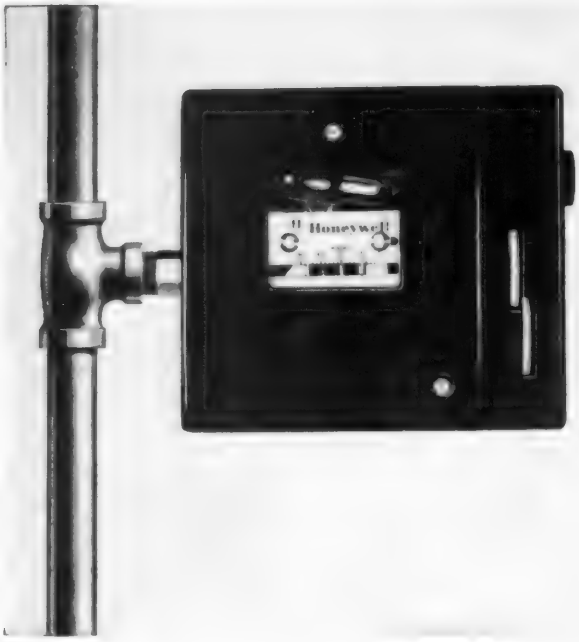

The floor tile that
never yields
TRI-PEDAL



P444

P428

Now the pressure switches you asked for...

P428 Flush Mounted

The new P444 Pressuretrol is a low-cost device for industrial application up to 150 p.s.i. The rugged P428 Pressuretrol is also designed specifically for industrial use. Use it for gas or liquids at pressures to 5000 p.s.i. Use either of them as controllers or as high or low limit devices. Their outstanding features are:

* **Convenient adjustment** — With set point and differential located on the front of the case for maximum visibility and accessibility.
* **Visible switch position** — Window in front of case reveals at a glance whether mercury switch is made or broken. Changeover versions available.
* **P428** has Bourdon tube actuation — Tube of beryllium copper or stainless steel depending on range.
* **P444** is diaphragm operated, using similar materials.
* **Rugged, attractive case** — Made of drawn steel with die-cast cover, case resists dust, weather, corrosion. Harmonizes well with other instruments when panel mounted.
* **Explosion-proof model** — Enclosed in its own integral case with external settings — not necessary to open case or break electrical connection. It is small and compact and requires no special housing or setting extensions . . . provides positive protection when used with hazardous gases or in hazardous atmospheres.

WRITE OR SEND THE COUPON TODAY
Honeywell Controls Limited
Ruislip Road East Greenford
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Please send me :

Specification Sheet No. 1011-1a (P428) ☐
Instruction Sheet No. 95-2600 (P444) ☐

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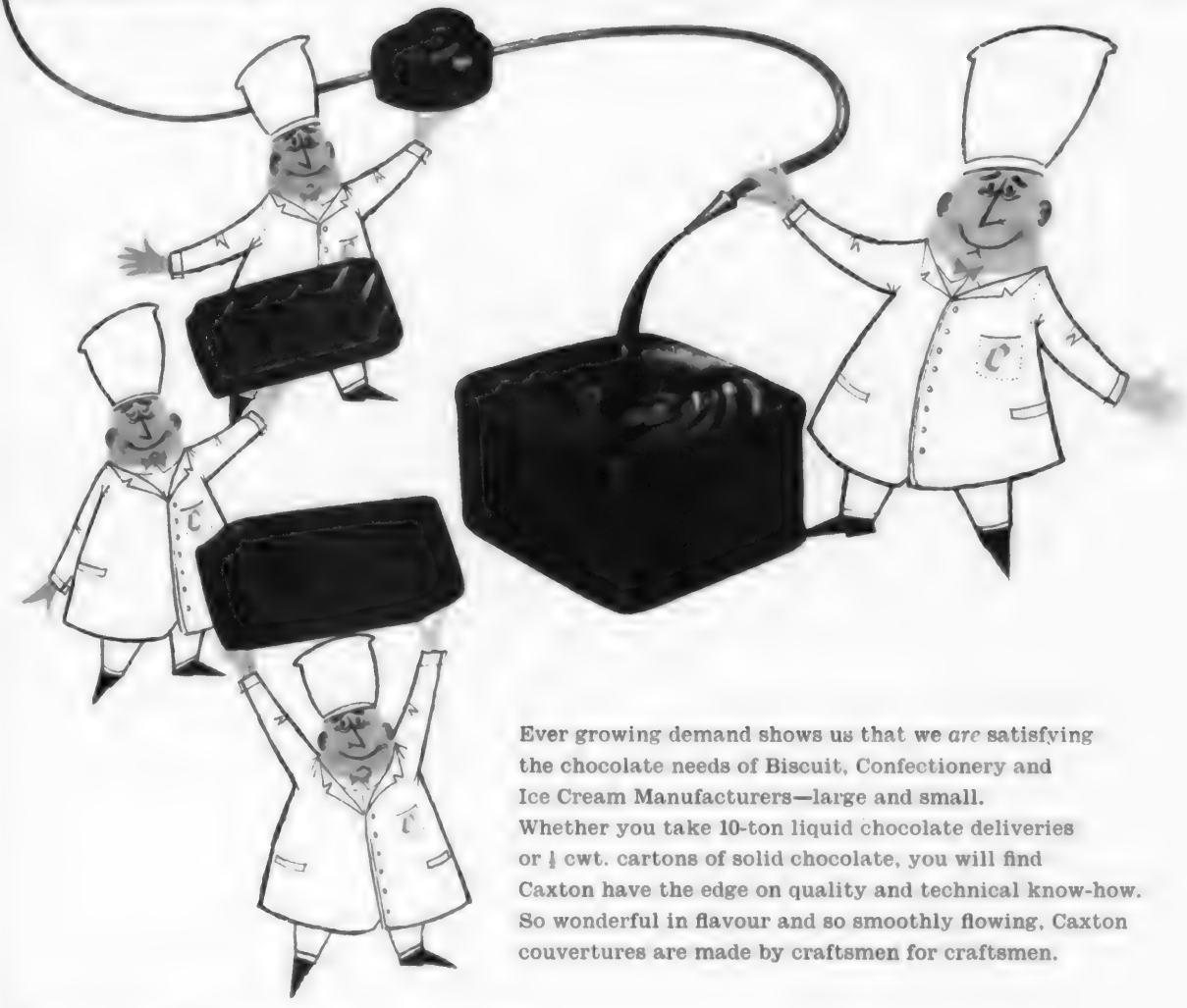
Branch offices in the principal cities of the United Kingdom and throughout the world.

Honeywell

First in Control

SINCE 1885



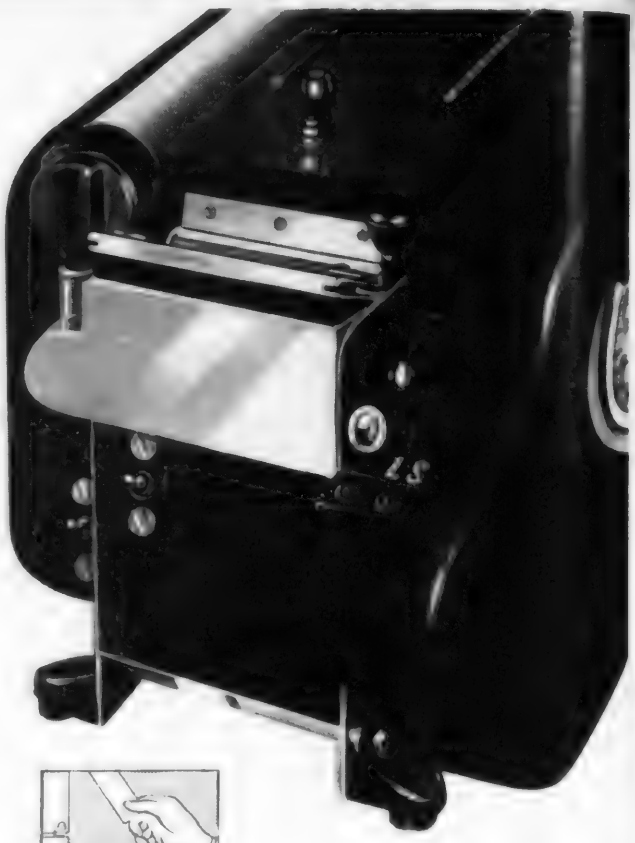
Ever growing demand shows us that we *are* satisfying the chocolate needs of Biscuit, Confectionery and Ice Cream Manufacturers—large and small. Whether you take 10-ton liquid chocolate deliveries or ¼ cwt. cartons of solid chocolate, you will find Caxton have the edge on quality and technical know-how. So wonderful in flavour and so smoothly flowing, Caxton couvertures are made by craftsmen for craftsmen.

Caxton **COUVERTURES CREATE CONFIDENCE**

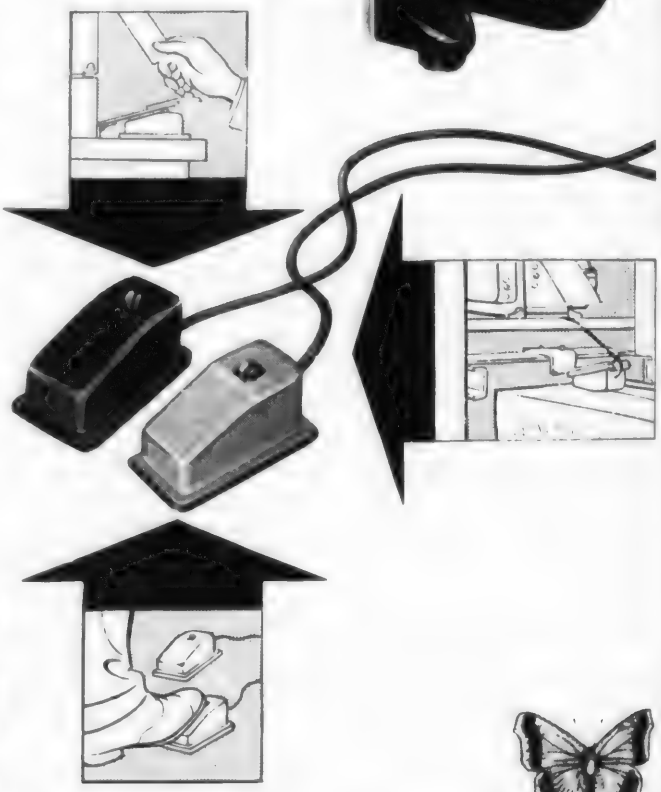
CAXTON CHOCOLATE COMPANY LIMITED, LONDON, N.22 BOWES PARK 4902/7
also GLASGOW, C.2 DOUGLAS 0919

hand-saving sealing!

–remote control takes over



A *feather-light* touch of the button . . . and Gumstrip Sealing Tape (Regd.) is moistened . . . cut and delivered. Operation is optionally by foot . . . leaving both hands free for packing. The high-speed Electric Tapeshooter makes work in your despatch department, lighter, quicker, more economical. Special features include ample water reservoir, water heater for quicker adhesion, 4" to 50" length control. May we arrange a demonstration on your premises? Test this machine for 7 days *without* obligation.



ELECTRIC
TAPESHOOTER

BUTTERFLY BRAND

SAMUEL JONES

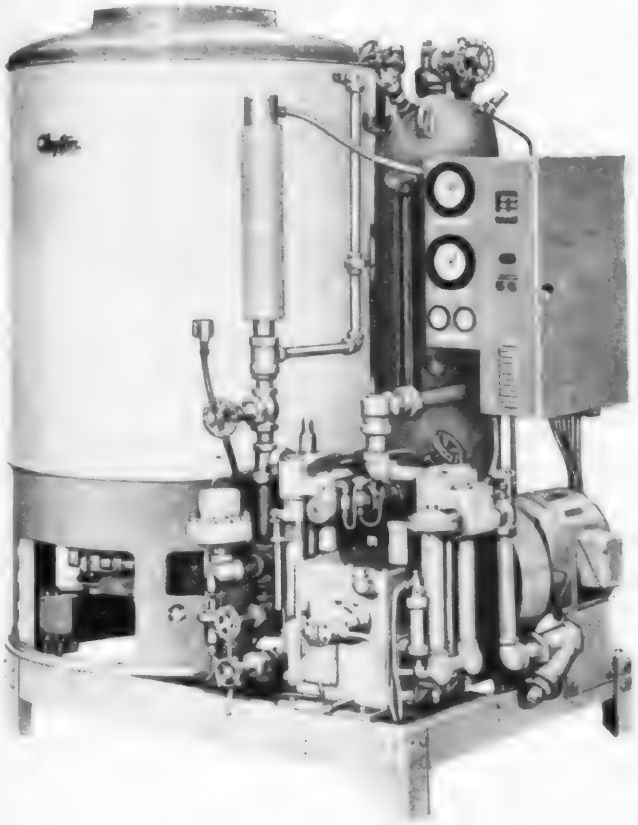
SAMUEL JONES & CO. LTD., DEPT F/M, NEW BRIDGE ST., LONDON E.C.4. TEL: FLEET STREET 6500

Clayton

Fully automatic oil-fired STEAM GENERATORS

give *steam instantaneously*

for heating, processing and other auxiliary services with:—



- ★ reduced fuel costs
- ★ immediate automatic operation from manual cold start
- ★ full operating pressure reached in less than five minutes from cold start
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- ★ safety, minimum maintenance and easy to service
- ★ spares and service throughout the world

Clayton Steam Generators are available with capacities ranging from 429 lb/hr. to 4600 lb hr. and can be supplied for firing by fuel oil of 220 or 950 secs. viscosity (Redwood No. 1).

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VFC.1D

This bottle carries a message, from Viscose to you and ultimately from you to the consumer.

In the struggle for sales, Viskring cellulose bottle closures are a first-class weapon. Bright, colourful, they catch the eye of the purchaser.

In addition to basic colour, Viskring can be printed with colourful designs or trade-marks, or with your own sales message! And of course they engender confidence — by being hygienic, by ensuring full measure (no loss by evaporation) by discouraging pilfering, and above all by preventing stoppers riding or blowing. Viskrings come in all sizes, are easy to fit and stay securely in place.

- **Easy to fit, self adjusting**
- **Prevent stoppers riding or blowing**
- **Secure screw caps**
- **Hygienic** ● **Non-inflammable**
- **Eye-catching** ● **Discourage pilfering**

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Streamline your production and reap the benefits of continuous processing by consulting the specialists.

OAKES HAVE NOW MOVED TO MACCLESFIELD

We are now operating the Sales, Service and Development of OAKES Continuous Process Machinery from the address given at the right.

Ideal for Swiss Rolls - Angel Cake
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Wafers - Marshmallow - Mayonnaise
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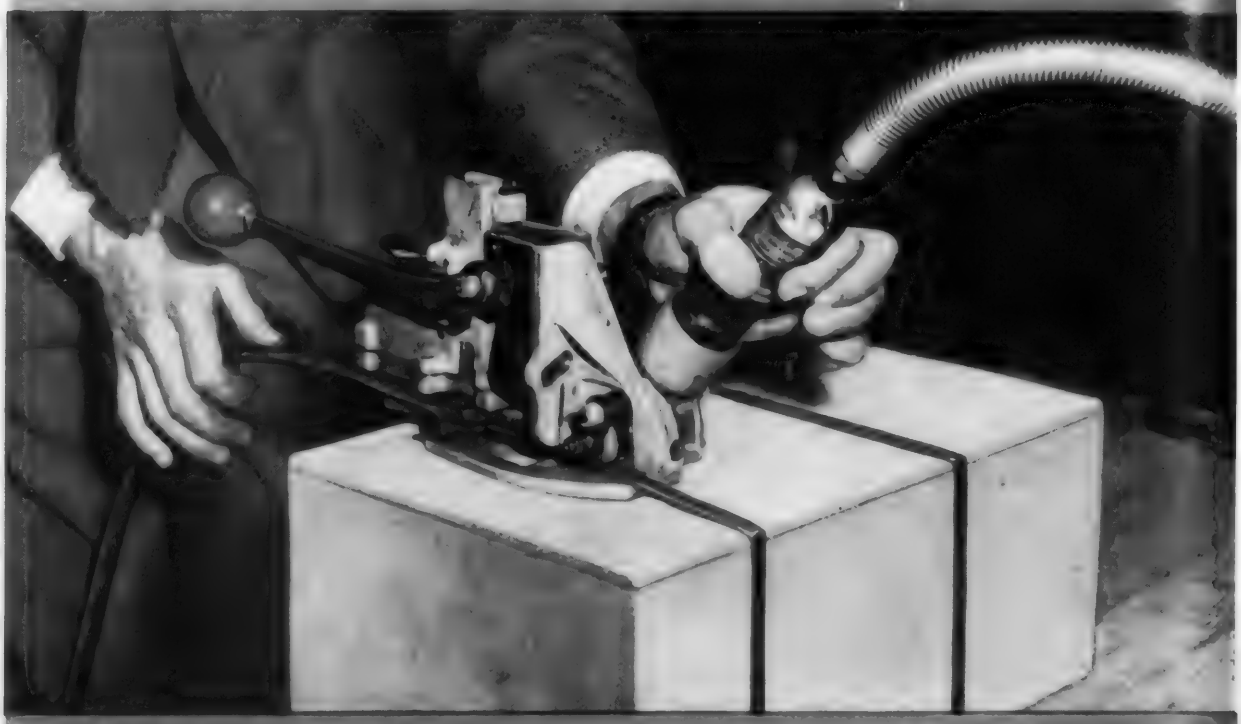
Oakes mixers are also widely used outside the food industry

Are you packing under pressure?



"Take the strain" with a . . .

SIGNODE *Pneumatic* **A.P. TOOL**

FROM ⅜" THROUGH TO ¾" STRAPPING

Your despatch staff can cope with more work with less fatigue with the latest addition to the range of Signode Pneumatics. This compact, combined tool stretches *and* seals—secures and safeguards—ensuring delivery of your products safe and sound, whether to the other side of the town or to the other side of the world. At the lowest unit packaging cost, too!

Airline Pressure P.S.I.	Approx. Strap Tension lbs.
90	1,600
80	1,425
70	1,200
60	1,050
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★ **Extra Protection**

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takes the guesswork out of commer

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IMC equipment, built to your own product requirements and can specifications, are precision built throughout in our European plant, with centralized automatic control board permitting one man to operate one or many complete sterilizing units. Protective stops and safety devices are provided for convenience of operation.

Thanks to these advantages you can produce a uniformly processed high quality pack at high speeds and with minimum labour costs; thus improving the sales value of your products while rapidly amortizing investment.

EXPERIENCE HAS PROVEN THESE IMC COOKER-COOLER ADVANTAGES:

LABOUR SAVINGS: The IMC Continuous Pressure Cooker and Cooler is often called the "One-Man Mass Production Kitchen". Only one man is required to maintain a battery of installations.

HIGHEST QUALITY PACKS: Agitating principle permits rapid heat penetration, and in most cases reduces cooking time. Every can is evenly cooked; every can is cooked exactly alike. High temperature short time cook often results in superior colour, flavour and texture.

DAMAGE AND HANDLING COSTS REDUCED: This continuous mechanical can handling process substantially reduces loss from can denting and damage.

STEAM SAVINGS: Substantial steam savings are possible through reduced processing and heat losses.

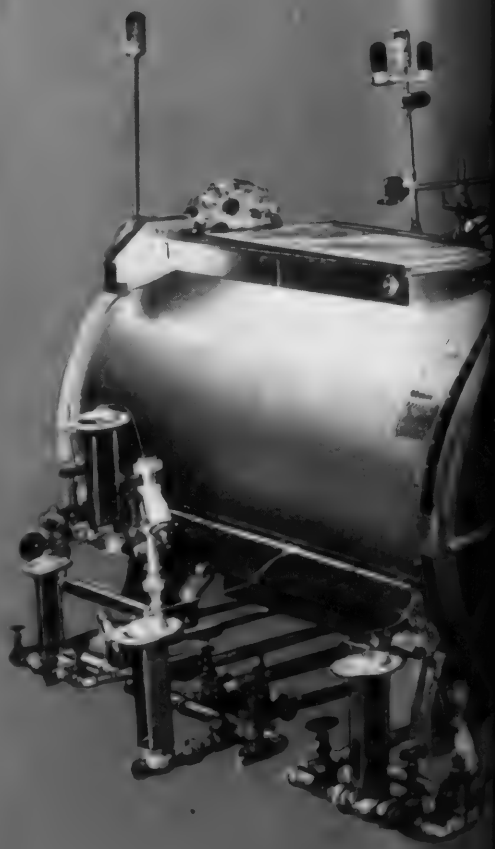
If your next canning season includes soups, vegetables, fruits and acid foods, milk, meat, ravioli, spaghetti or other mixed foods, be sure to request our literature, a quotation, or the visit of one of our engineers to assist you in budgeting for higher quality at lower cost.

SPECIAL COMBINATION

FLEXIBILITY

NEW EUROPEAN STANDARD

The most widely used food processing equipment in the world is IMC FMC equipment, now built and readily available in Europe.



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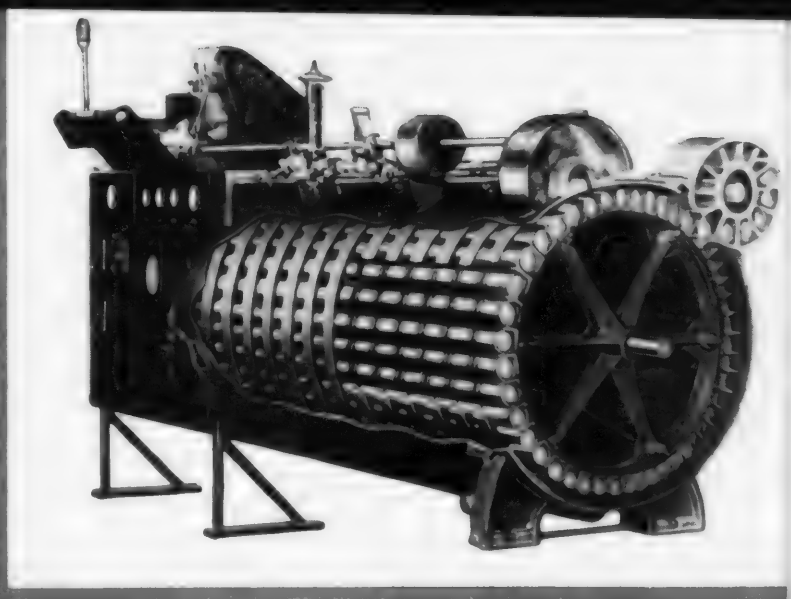
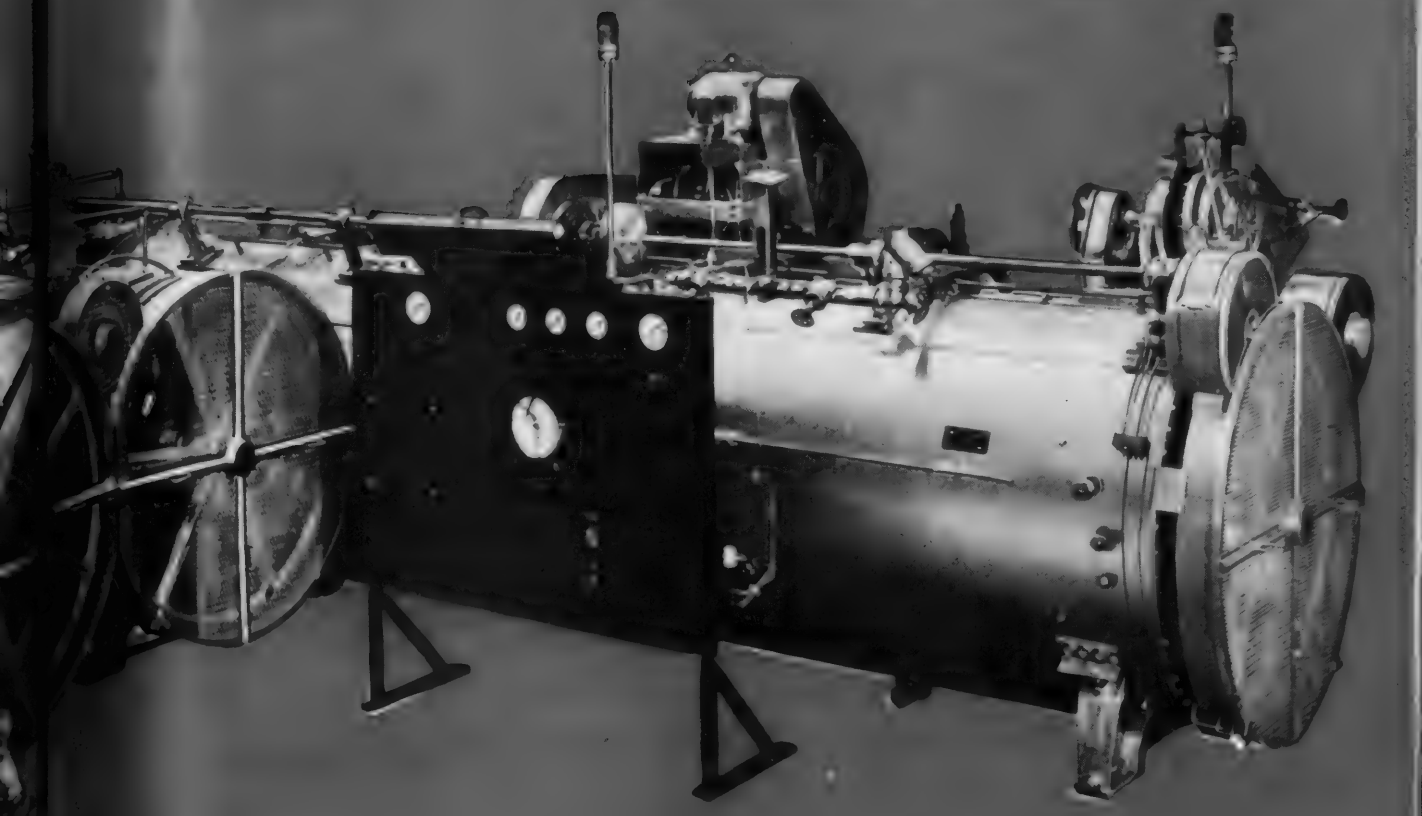
ood processing





IMC S.A. INTERNATIONAL MACHINERY CORPORATION

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Representatives and licensees for Food Machinery and Chemical Corporation and other leading U.S. manufacturers of food processing and canning equipment.

"There's more to Sellotape than just tearing off a strip..."

says the man with the little black box

Time and cost-saving SELLOMATION ideas can be tailored to fit a production line, a packaging or packing operation or—in the marketing of a product—a publicity campaign.

If asked to define the aims of the service in one word, we would say SIMPLIFICATION. In all fairness, we must add that the magic simplifying touch of "Sellotape" is not brought about by one self-adhesive product. There is a whole range of stick-at-a-touch media, containing products widely differing in character, that have been specially produced to solve the problems of many industries.

Our consultants are the key to the situation because they know all about them. Can you really afford to be without *full* information on the SELLOMATION SERVICE?

Your call to BIShopsgate 6511 may offer the challenge that makes our job worthwhile.

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GORDON & GOTCH (SELLOTAPE) LIMITED · INDUSTRIAL DIVISION
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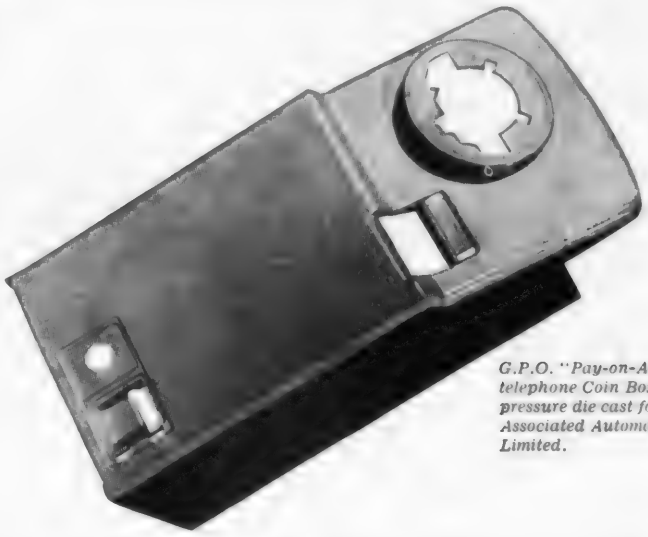
it can be done

Offset the rising spiral in production costs? It can be done. Hiduminium is doing it. This casting is typical of a number of components of intricate design which used to be assembled from many parts—but which can now be made in one piece as an H.D.A. Pressure Die Casting. You can turn a dozen operations into one—with Hiduminium alloys and H.D.A. Techniques.



G.P.O. "Pay-on-Answer" telephone Coin Box, pressure die cast for Associated Automation Limited.

Hiduminium

makes the most of *Aluminium*

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NEW EXCLUSIVE TO Rapistan APC

ADJUSTABLE PRESSURE CONVEYOR

So smooth — will even carry a glass of water without spilling

Your most fragile or expensive goods can now be safely carried on Rapistan's revolutionary new APC Conveyor. So smooth in action it carries a full glass of water *without spilling a drop*....so sensitive that a whole line of cartons can be held by a finger-tip *without risk of damage* to cartons or contents.

Cartons accumulated during a halt are automatically 'singulated' (spaced-out) on restarting. Tiered loads; high centre-of-gravity goods travel without toppling on Rapistan APC Conveyor.

Rapistan APC Conveyor is designed to form part of an integrated flow system....helps tailor your Conveyor to your needs.

- **ELIMINATES BUILD-UP OF ACCUMULATED-CARTON PRESSURE**
- **AUTOMATICALLY SPACES CARTONS**
- **REDUCES POWER REQUIREMENTS**
- **KID-GLOVE HANDLING**

So clever it almost thinks! Rapistan APC Conveyor has load-bearing wheels on either side of a power belt. Beneath the belt, trigger wheels and pressure wheels interact so that the first carton in an accumulated line, resting on a trigger wheel, causes the power belt to be pulled away from succeeding cartons. 'Line-pressure' can therefore never exceed that of one carton.

On restarting, the power belt does not contact any carton until after its predecessor has moved forward, thus 'singulating' all goods. The smooth starting, smooth travelling resulting from this smooth 'clutching' action ensures the complete safety of goods hitherto 'unsuitable' for power conveyors. Low power requirements (up to 200 ft. of conveyor powered by $\frac{1}{4}$ to $\frac{3}{4}$ h.p. drive) means economical power-units; low running costs; less belt-stretch because less belt-tension. —You need to know more about APC.

Send now for the fully illustrated APC Brochure

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DEPT. I, SUTTON ROAD, HULL **'PHONE: HULL 13996 (3 lines)**

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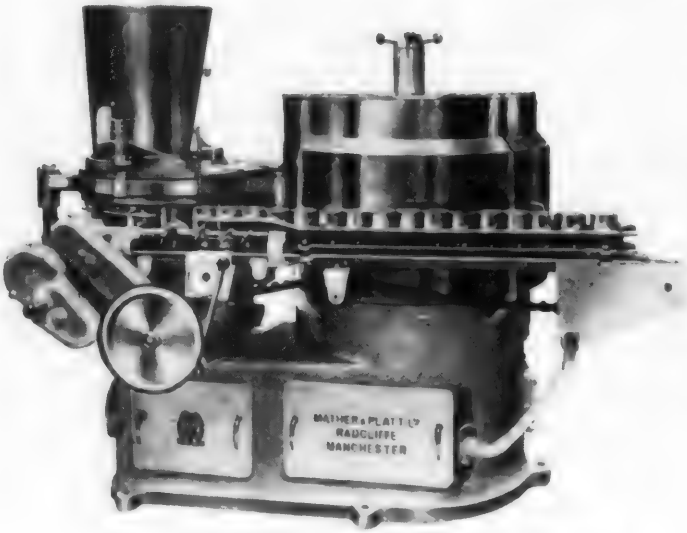
High-speed Universal Filler (500 cpm)



High-speed Solid and Liquid Filler (300 cpm)

A10 Can Filler (30 cpm)

MODERN FILLING MACHINERY

These modern machines are part of a new and complete range of designs by Mather & Platt Ltd for the canning industry.
They combine a high degree of accuracy with high speed and simple and economical maintenance.

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LIMITED

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He thinks we're good too

As a boxmaker he likes talking to us at Thames Board Mills. He finds we have ready sympathy with his problems and our expertise and knowledge really help him. Even the most intricate boxmaking ideas can be effectively put into production through the use of "Thames Board".

Good packaging starts with **'THAMES BOARD'**

THAMES BOARD MILLS LTD., PURFLEET, ESSEX & WARRINGTON, LANCS

Also the sole manufacturers of "Fiberite" Packing Cases

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automatic liquid process control systems

suit every purpose...

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A PARKINSON COWAN COMPANY

food needs thought

Chocolate, pastries, chicken, fish? If you have food to store or send away, "Heston" have already thought about and designed the tray or container. Shallow trays, perforated trays, freezing trays, bulk containers—all are of aluminium for hygiene, lightness and strength, all help to keep food safe and are quick to clean. Also, Heston trays interstack, a sensible use of space making movement in bulk simple—simpler still when Heston trollies are used! Even fully loaded they move on slopes in safety.

Let **heston** help

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This covers contract and design problems and ideas will gladly be submitted for your consideration. Please write for illustrated catalogue.

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—so very useful when handling juices, jellies, pulps, powders and all foodstuffs.

DIFFERENT - - to ensure perfect closure even with solids in suspension

SAUNDERS DIAPHRAGM VALVES

Grit or small solids in the fluid, if trapped on closure, just embed themselves in the flexible diaphragm and are freed when the valve is opened.

SAUNDERS VALVE COMPANY LIMITED

DIAPHRAGM VALVE DIVISION

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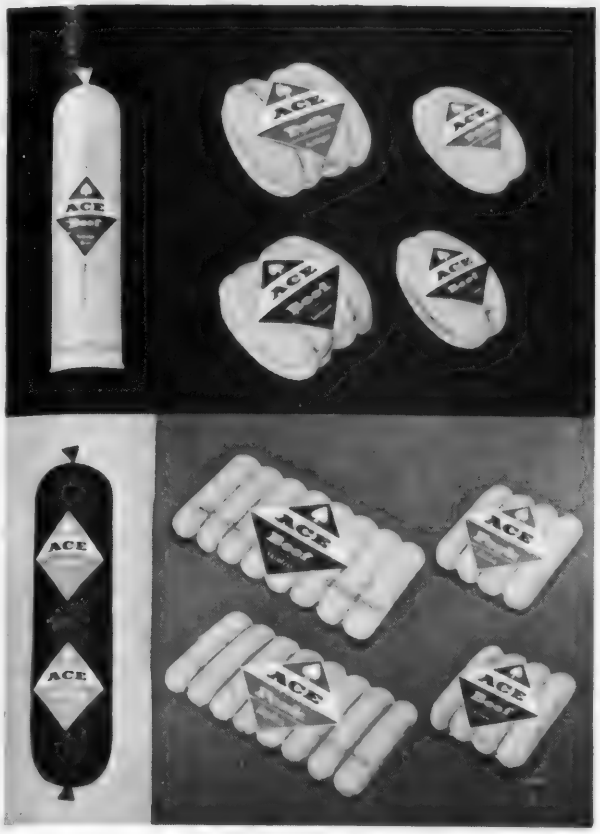

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Improves flavour
Retains juiciness
Ensures consistency
Adds nourishment

Gervita is the most advanced animal protein known. It is a free flowing powder, neutral in flavour, free from harmful bacteria and containing over 80% pure animal protein in its most digestible form.

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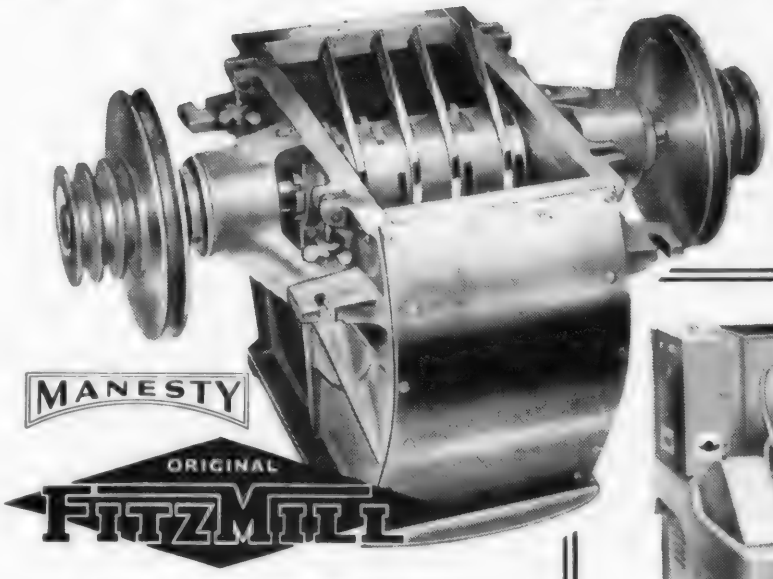

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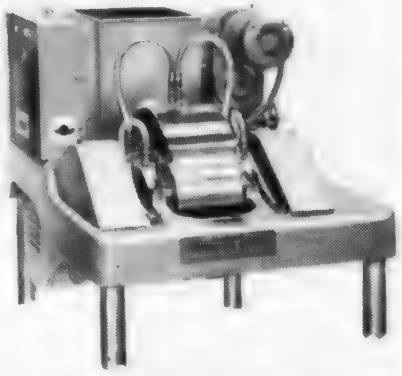

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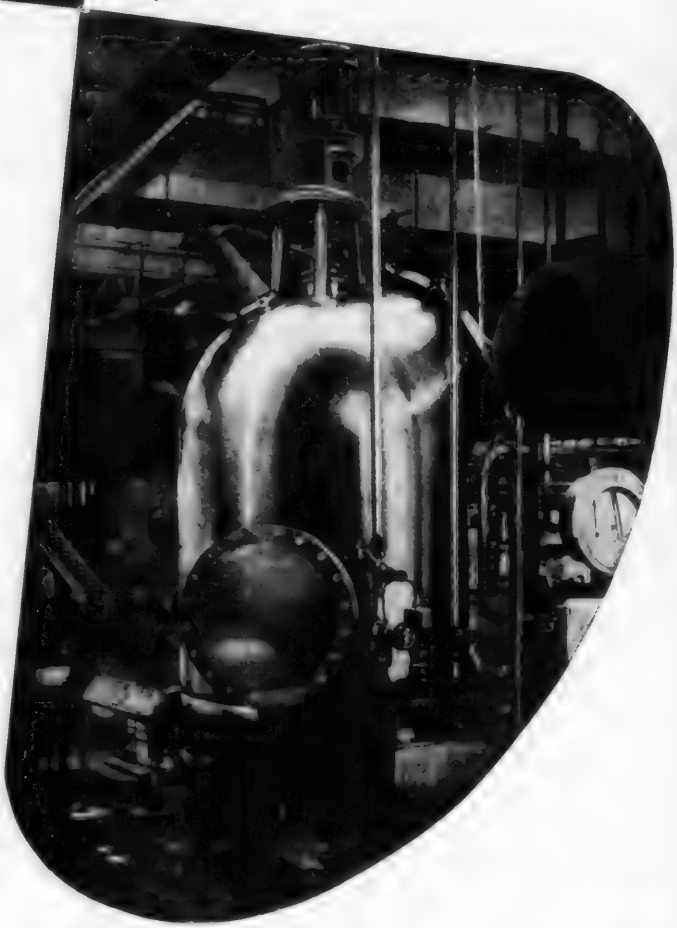

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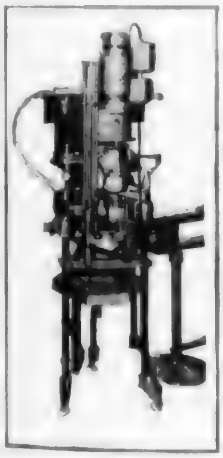

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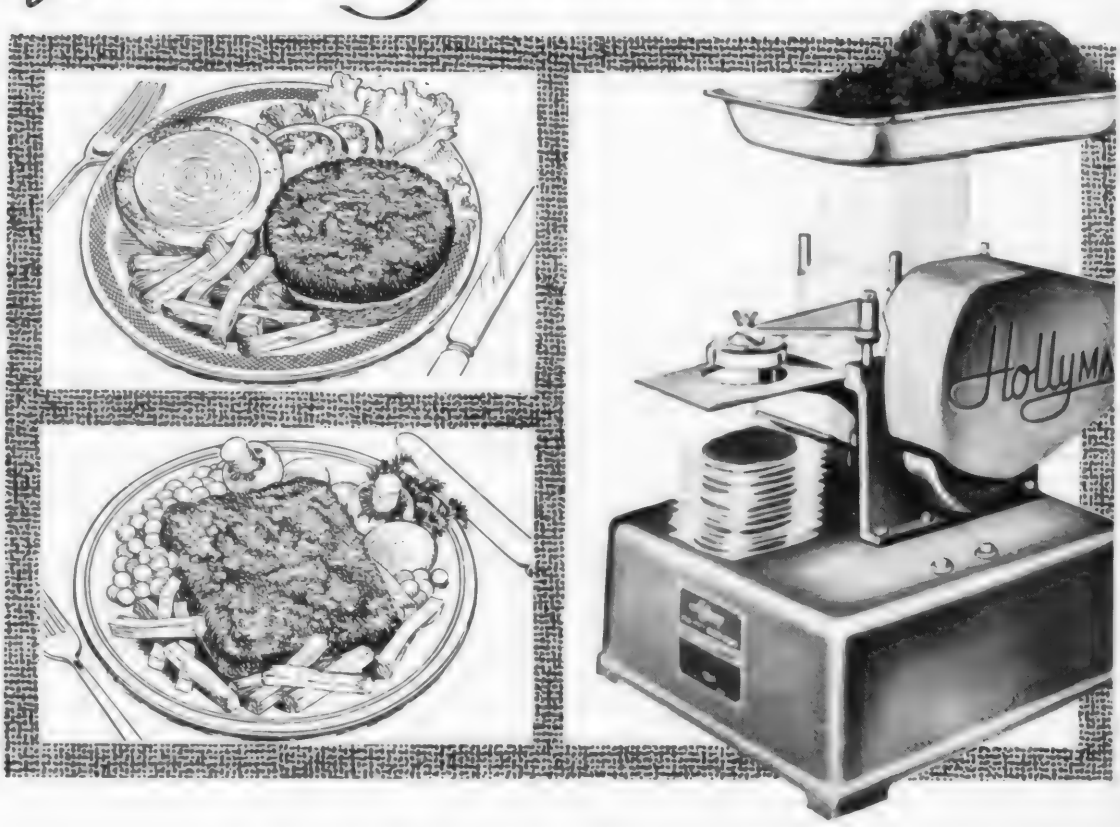

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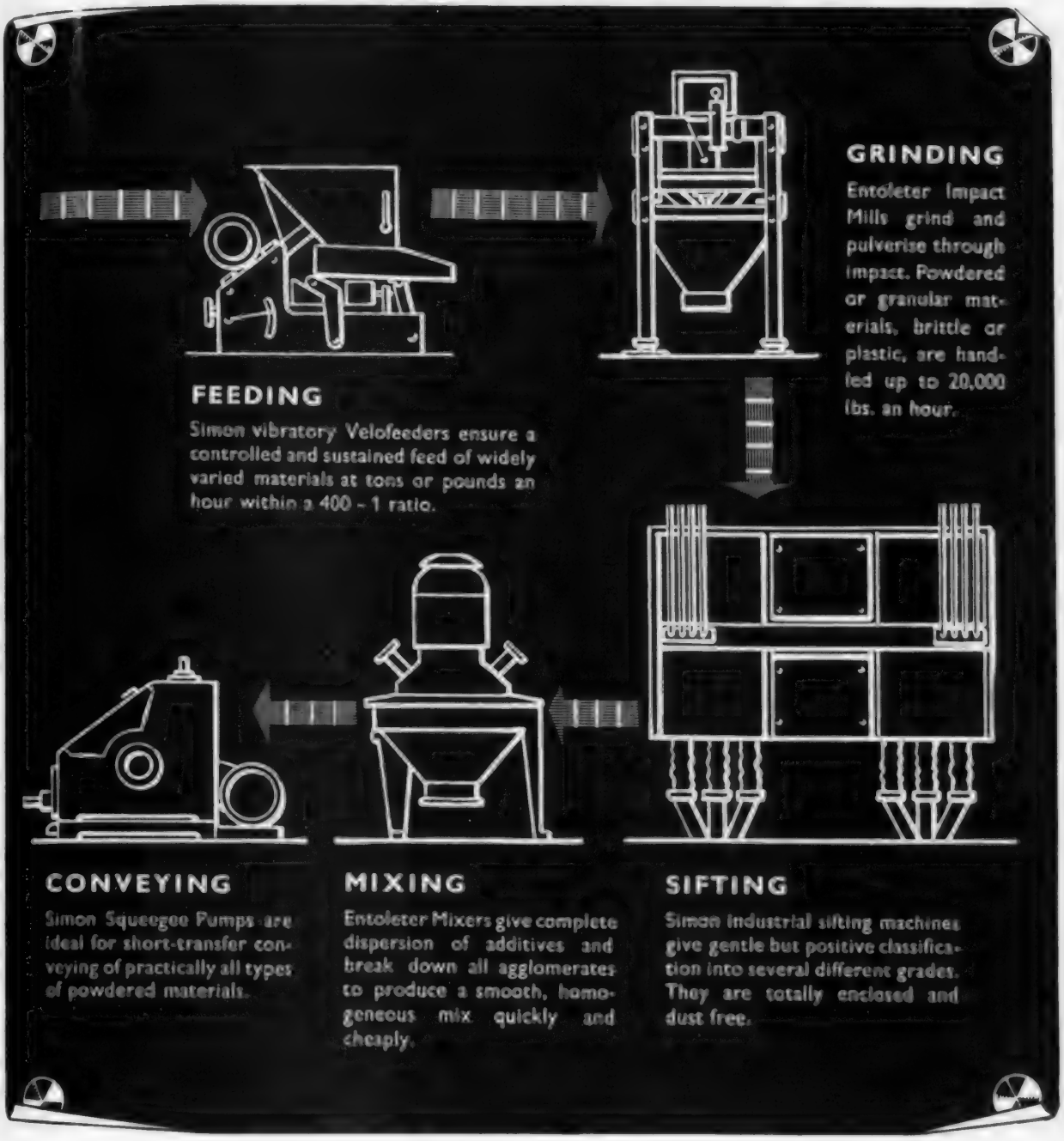

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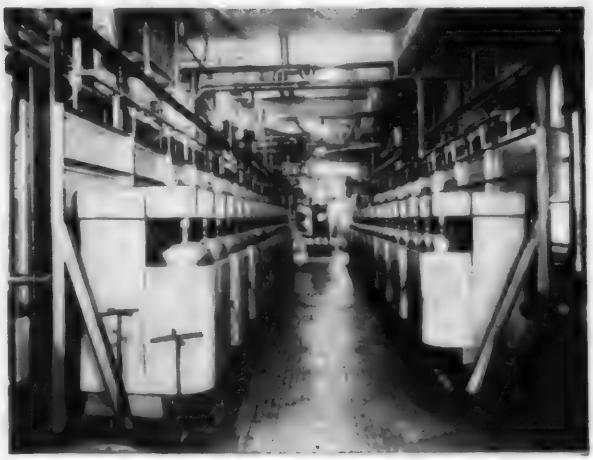

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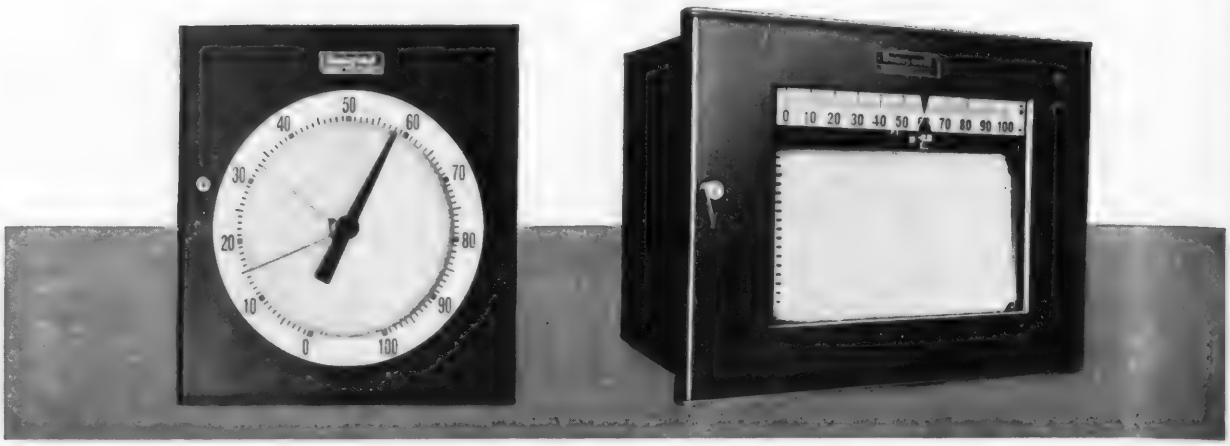

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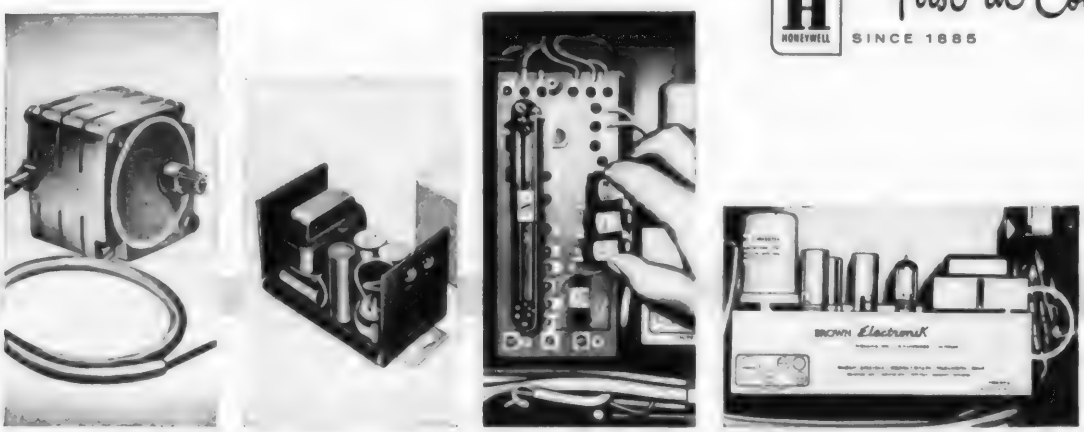

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FOOD MANUFACTURE

Volume XXXV. Number 6 Editor: Anthony Woollen, B.Sc., A.R.C.S., A.R.I.C. June 1, 1960

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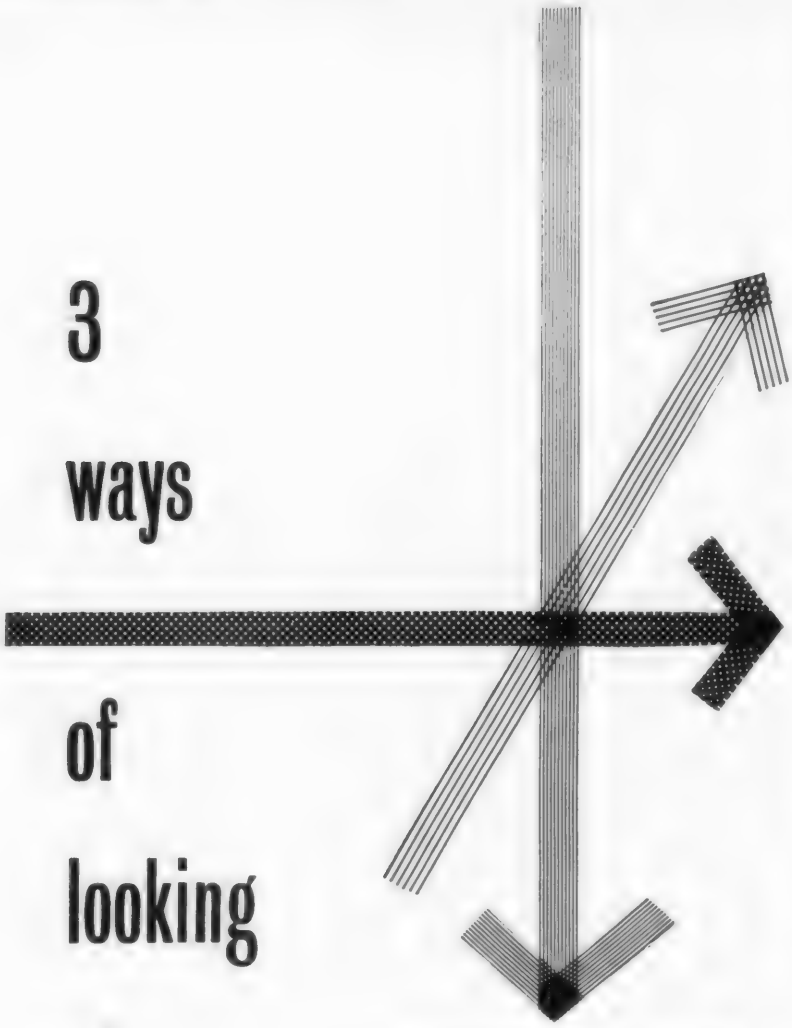

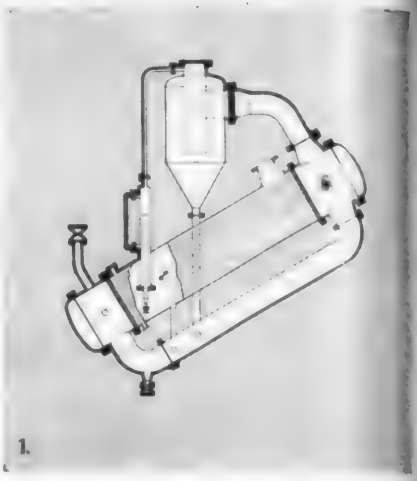

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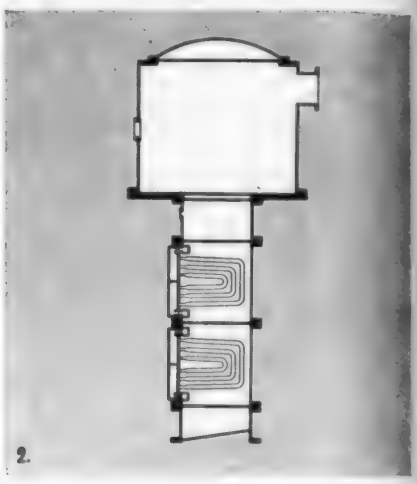

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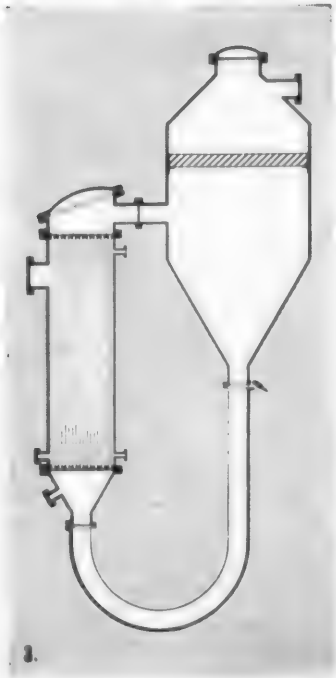

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FOOD MANUFACTURE

Vol. XXXV, No. 6 June 1, 1960

Mechanised selling

WHAT used to be referred to as putting a penny in the slot is now dignified by the rather pompous title of "automatic vending." The tendency to describe things by ponderous words of Latin derivation instead of basic English would be a suitable subject of study for an etymolygist with psychological leanings; perhaps it has something to do with the decline of classical scholarship, a case of substituting phoney Latin for real in the hope that nobody will notice the difference. We beg pardon for this unwarranted digression. The subject, after all, is not etymology but "automatic vending," which is certainly in the news just now, for slot machines are invading spheres no one would have thought of a few years ago.

Machines for the automatic dispensing of packaged items such as chocolate bars and cigarettes have been with us for more years than we can bother to remember. These have hitherto been considered as little more than an adjunct to selling over the counter, an indefinite extension, so to speak, of shopping hours, and a convenience for the man who runs out of fags when the shops have shut. But the mechanical salesman is increasingly likely to greet us in unexpected quarters. It is conceivable, for example, that in a few short years a housewife will, on visiting the supermarket, have her order fed to a computer which will select the items from a completely automatic warehouse and deliver them into her basket down a chute quicker than it takes to read this, tot up the bill, accept her money and give whatever change is necessary. Whether we like this form of shopping is beside the point, for already the essentials of this system have been developed and questing human ingenuity will assuredly bring it to pass.

Concerning ourselves with immediate realities, one of the spheres where mechanised selling is making great progress is in the dairy industry, where automatic machines are tapping new sources and creating demands where none existed before. The great merit of vending machines is that they seize upon the casual passer-by outside shopping hours, and tactically-sited machines dispensing milk (in cartons or as hot or cold beverage), tea and ice cream have great possibilities in increasing sales.

The large orders now being placed for such machines are a sure sign that automatic vending has come to stay, bringing with it its own problems. Among the latter, the question of hygiene will be prominent, especially where dispensing of liquids and ice cream are concerned. These problems must not be underestimated by the firms new to this business who will no doubt be attracted into making these machines.

Vending machines and hygiene

HYGIENE considerations of vending machines are spotlighted by the rapidly increasing numbers of these machines coming into use, especially in factories and on street sites where there may not be a convenient supply of hot water nearby to facilitate proper cleaning. It has been said that some makers are paying more attention to the exterior styling than to the internal mechanism, which is often needlessly complicated and difficult to clean. Complication militates against hygiene, for accessibility is reduced and nooks and crannies abound where dirt can accumulate.

The question of siting is important, not only from the sales but also from the hygiene point of view. Many milk vending machines are outside dairies, which presumably have hot water available, and cleaning problems in these places present little difficulty, but not all sites are as satisfactory. These machines tend to be more successful in the more crowded centres of towns, where the majority of dwellings are small flats, furnished rooms and mews without refrigerators. For obvious reasons they are very popular with children, who enjoy manipulating them. These facts emphasise the importance of hygiene.

Although food legislation already covers the major requirements of sanitation in this field, it is instructive to study the American Health and Sanitation Code for automatic food vending. Mr. T. Morley Parry, Food Hygiene Advisory Officer to the Ministry of Health, has drawn attention to some of its provisions, among which are: food vending machines should have a thermometer indicating the air temperature in the storage compartment; any part com-

ing into contact with food should be removed daily and thoroughly cleaned; food containers inside should be protected from handling, dust and insects; the machine should be protected from overhead leakage from drains and piping, and its site around and underneath should be smooth and easily cleaned; it should have an automatic shut-off device to put it out of operation if any container overflows; internally it should have a minimum of inaccessible services, and product contact surfaces should be non-toxic and corrosion resistant, with smooth welds and round angles.

If the only person who sees the inside of such machines for long periods on end is the unsupervised service van driver who replenishes it daily, servicing and hygiene must be as foolproof as possible, preferably by the simple replacement of an empty container by a full one which has been filled, sealed and sterilised at the factory. A date-of-cleaning tag inserted in the same way as the time-of-collection tag of a mail box would be a great advantage.

A Commonwealth Council of Nutrition?

A RECENT letter in *The Times*, over the signatures of Dr. Francis Aylward, Professor Yudkin and a number of other prominent people in the fields of medicine, public health and nutrition, calls for the setting up of an agency, analogous to the recently established Commonwealth Council on Education, to co-ordinate the services of workers in different fields and different countries for the common purpose of overcoming food shortages and malnutrition in numerous countries overseas.

Several of the countries most concerned are members of the British Commonwealth, and we wholeheartedly endorse the suggestion that the time is now opportune for the setting up of such an organisation to tackle problems in the Commonwealth. In this field, workers in many separate spheres of study—medicine, agriculture, education, food technology, the social sciences, as well as research workers in various fields—have the common object of improving living standards, abolishing poverty and want, and raising the food supply in the backward countries, and an organisation which can co-ordinate the efforts of these workers effectively, provide a forum for exchanging their ideas, initiate projects, disseminate information, and facilitate the secondment for active service overseas would be of great value.

The vicious cycle mentioned in the letter—poor food, bad nutrition, ill-health, physical weakness and apathy, decline in agricultural production—although important, is only part of the problem, and possibly only a minor part. If the problem were as simple as that, it could be solved comparatively quickly. A great obstacle to advance is that in many of the countries concerned there is hardly any awareness that a problem exists at all. We Europeans, with a thousand years of culture behind us, spurred to activity and industry by commercial competition, educated to believe that Western civilisation, and particularly scientific civilisation, is the best for the whole world, tend to forget that there are other attitudes to life and that other people are different from ourselves. We who survey the whole world and who imagine that we are at the centre of it are really very provincial and narrow-minded; the world is still a vast place, and modern means of communication, while they have shrunk it physically, have left its spirit largely untouched.

There are places still on this earth where the difference between rich and poor is unimaginable to dwellers in Western democracies, where the power of men in high places is completely impervious to what a westerner would consider self-evident commonsense. We gravely delude ourselves if we imagine that because there are luxury hotels in Baghdad and ice-cream parlours in Karachi, Western ways of thought in these places are more than skin deep. Compared with that, the problem of growing food in a desert is trivial. The real obstacle is the entrenched and invincible power of men who are quite satisfied with things as they are.

Doctors not worth their salt

"INFLEXIBLE," "unadaptable," "incapable of original work" are some of the descriptions being applied to a good proportion of recent recipients of the Ph.D. degree, that coveted certificate of competence, that "master-mariner's ticket" as Dr. John Ziman, Fellow of King's College, Cambridge, called it in a recent broadcast. These descriptions are being applied, not by college authorities, but by industrialists. "We set our students problems they can do," said Dr. Ziman, "we help them with hints and advice, and, in the end, we 'get them through' their Ph.D.s." This picture of a class of candidates being nursed and coaxed through their course like schoolchildren being coached for their school-leaving certificate accords ill with the accepted idea that a doctor is the author of an original thesis who has made a definite contribution to knowledge. It is rather shattering to learn that Cambridge is apparently playing a leading part in the devaluation of our principal degree.

It is seemingly impossible to make progress in the world of industry without being in possession of a string of letters after one's name, hence the vigorous calls from all aspirants to the ranks of the "top people" for more and yet more diplomas, degrees and other academic distinctions. Those unfortunate enough not to secure full-time admission to a univer-

sity or technical college try the hard way of part-time study at evening classes; that the going by this route is heavy is proved by the fact that some 80% of those who take it fail to make the grade. Now we have a clamour for research diplomas which can be taken on the basis of work carried out in industrial research laboratories.

All this interest in marks of academic distinction is good and beneficial provided that the marks themselves are worth something and are recognised as such; a lowering of standards, however, in order to secure the admission to qualified ranks of less worthy aspirants is not to be tolerated. It is precisely this which seems to be happening in the case of the Ph.D. degree. A mark of distinction cannot be greater than the worth of the holder. Industry cannot get enough men of the right quality who have the brains to think of new ideas and the ability to put them into effect. Men with good degrees are, therefore, in the fortunate position of being able to pick and choose their jobs. As a safeguard for them and for their employers' benefit, the standard of English degrees must be maintained at all costs.

Some of this country's best original work has been and is being done by men who were not fortunate enough to acquire Ph.D.s; one of this country's leading professors, a Fellow of the Royal Society, has never sat for a single degree examination. If the distinguished title "doctor" is to continue to mean something, the conditions attached to its acquisition must be made more strict.

The biggest "P" in the world

A STRUCTURE weighing 100 tons carrys the world's largest advertisement, exhorting the citizens of Chicago to "Be sociable—have a Pepsi" with the aid of more than a mile of neon tubing and 5,000 lights. The letter P in the word "Pepsi" is 51 feet high and is claimed to be the largest single letter in the world. It has an accompanying news board, "an electronic marvel which offers news one hour faster than the famous New York Times board," and is claimed to be one of the biggest and most colourful advertisements ever erected. We can well believe it.

Pest killers and the public—II

THE controversy over pesticides has flared up again with a renewed assault by the anti-pesticide forces. A recent article in the *Daily Telegraph* described the toll of animal and bird life taken by sprays and pesticides. In 46½ acres of Brussels sprouts in Gloucestershire sprayed with an insecticide, there were found lying dead "19 partridges, 10 pheasants, 129 other birds, two hares, seven rabbits, two rats, four mice, a stoat and a grey squirrel." On 1,500 acres near Hitchin, "about 330 small birds, partridges, pheasants, hares and rabbits were picked up." The toll of domestic animals to date includes "at least 12 bullocks, 14 cows, 49 sheep, one donkey, and a number of dogs which have been taken ill as a result of licking their feet after running through potato haulms which had been dressed with arsenite sprays."

One could say, of course, that the animals concerned had no business to be poking about among the sprouts and potatoes, but the matter becomes more serious when, if what the article says is true, thousands of bees were destroyed in Essex last year, resulting in no pollination of many fruit trees and no fruit on them. Probably the farmers concerned applied the pesticides a little too enthusiastically and in greater quantity than was necessary. How is this to be prevented? Primitive societies are faced with the menace of shifting cultivation, burning-off of grassland, soil-erosion and soil-impoverishment. In our enthusiasm to overcome the ancient enemies of good husbandry with the means provided by science, are we overdoing it?

Perhaps the answer lies in the development of biological substances highly selective in their action and harmless to all life except what is intended. If enough of these became available, poisonous chemicals could be abandoned. The *New Scientist* recently described some Czech work on a living insecticide, the spore material of the bacterium *Bacillus thuringiensis*, which is lethal to caterpillars and which remains so even after six years' storage in the dry state. It is encouraging to learn that intensive work is going on to discover more insecticides of this kind which are highly specific yet harmless to men, animals and useful insects such as bees.

Desiccated Coconut

SALMONELLA infection of shipments of desiccated coconut imported from Ceylon are causing concern to everyone in the trade except, it seems, to the Ceylonese. The situation is becoming so bad that unless the millers in Ceylon improve their methods, their business may collapse completely.

Desiccated coconut is used widely in the baking and confectionery trades, and the infection by salmonellæ of whole shipments, resulting in the condemnation by port health authorities of 19% of all imports as unfit for consumption, is a serious matter. It is not possible to examine every sack of material which comes into the country, and there is grave risk of infected material slipping through the harassed fingers of the overworked public health people

who are having to subject every consignment to test.

There is no doubt at all that the cause of the trouble is the unhygienic harvesting, milling, packing and despatching in Ceylon. As the coconut comes off the tree it is free from salmonellæ, which can only be introduced in the subsequent handling. One who has lived in Ceylon in close association with the coconut industry has told us something of the processing methods there, which convinces us that only a radical reorganisation of the business in Ceylon on sound hygienic lines can save the trade.

All too often process water is drawn from sources in which man and beast wash and do other things as well. Buildings are poorly roofed with rotting galvanised iron; handling of nuts during splitting and paring is grossly unhygienic; and to cap all, the pernicious practice of transporting the coconut in reused jute sacks which are never cleaned ensures the maximum spread of infection.

This sort of problem invariably arises when food is exported from what the Victorians complacently called "inferior foreign nations" to countries where food hygiene is taken seriously. Manufacturers in general are not in business primarily for the good of others, but to make money; this is even truer in the less enlightened countries where so long as the manufacturer makes a good profit he is not concerned about improving methods. This attitude may work very well in local trade but it will not do for consumers in this country. It soon will not do for the foreign countries concerned; if the manufacturers in them find that lack of hygiene hits their pockets, they will quickly become zealously clean.

What is unfair in the present situation is that the whole burden of testing is being borne by our public health authorities. It should be the manufacturers' responsibility for ensuring the quality of their products, not the importers'.

Symposia

WE have until now always assumed that a symposium was a meeting or gathering arranged for the collection and exchange of opinions on various aspects of a subject, but we have apparently greatly erred. The large number of symposia which are held these days prompted us to look up the Concise Oxford Dictionary on the subject; somewhat to our surprise we learned that a symposium was "an ancient Greek after-dinner drinking party with music, dancers or conversation."

We decided to probe further into the matter, but Nuttall's Standard Dictionary gave an even worse account of a "sim-*po*-ze-um," describing it as a "drinking together, a merry feast," and a "banquet with philosophical discussion."

We have frequently reported that "the symposium was well attended" and in view of the above, some of our readers may think that it probably deserved to be. Scientists are, after all, quite human people in spite of the impression created by the popular press.

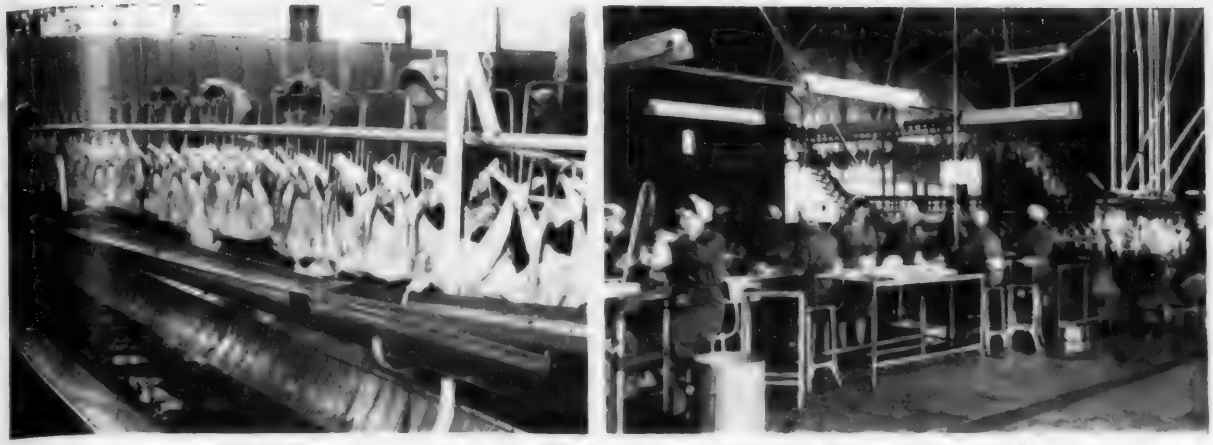
The teenage market

"TEENAGERS," we learn from a press release, are young people between the ages of 12 and 25, a rather elastic definition, we think, but what, after all, is in a name? The important point to those concerned is that there is sufficient free cash floating in the pockets of this group to attract the attentions of those wishing to prise some of it away by the legitimate means of commerce. In other words, the teenage market is sizeable enough to be worth exploiting.

A generation or more ago the teenager was a rather subdued person of no account who was to be seen but not heard. If he left school at 14 his wages were scanty, and largely earmarked for the support of Mum and Dad. The welfare state and the emancipation of youth has changed all that. The young person of today has more spare cash in his pocket that his parents ever dreamed of. What he does with it is now the subject of market surveys, and specialised "techniques" of selling to teenagers are being evolved. It is a sign of the times that teenagers' ideas on taste are being moulded, not by their parents as in the past, but by advertisers through the medium of the increasing number of newspapers and magazines directly aimed at this group.

It is estimated that teenage spending amounts to £3 million per day, of which not more than 20% goes on rent and keep. How much of it is spent on food we are not told, but expenditure on beer by boys, according to a recent survey, jumps in a startling way at the age of 16.

Whatever else changes in this world, human nature remains the same from one generation to the next. There is no reason to suppose that the young person of today is any different, or is either more or less mature, than his father was at the same age. In his new-found freedom he is less influenced by the advice of those more experienced in the ways of the world, and less sheltered from the attentions of those who shriek at him from press, cinema, radio and television. Small wonder that the teenager is a rather self-conscious creature, inclined to hide his bewilderment beneath a brave show of worldly wisdom. Those who cater for his needs or who seek to mould his tastes therefore bear a heavier responsibility than those who deal with adults; it is to be hoped that those who devise "techniques" for exploiting this market will bear these points in mind.



(Left): **Cleaning of the carcases, which are suspended by neck and legs for ease of handling. Edible offal is put into the upper trough for collection in wire baskets; inedible offal is put in the lower trough, for washing away to waste.** *(Right)*: **A view of the packing and trussing section.**

How Broilers are Processed

Buxted's Aldershot poultry plant is world's most modern

Recently completed at a cost of £300,000, the Aldershot factory of the Buxted Chicken Co. is planned to turn out 300,000 oven-ready birds a week, half the company's total output. What this means in terms of machinery and methods is told in the following article, based on a recent FOOD MANUFACTURE visit to the factory.

ACCORDING to Mr. Anthony Fisher, chairman of the Buxted Chicken Co., an investment of about £1 million is required for a sustained production of 100,000 broiler chickens per week. The financial stake, therefore, in Britain's fast-growing broiler industry, which next year may turn out considerably more than 100 million birds, is substantial. At the present time, this industry is expanding about as fast as it can go without falling over itself; the future seems assured, since present output represents a consumption of only 3½ lb. of broiler per head of the population per year, under 3% of the total meat and poultry consumed, compared with 12½% in the U.S.A.

The biggest single unit in the British broiler industry is the Buxted Chicken Co., Ltd., whose three packing stations, at Buxted in Sussex, Boreham in Essex, and Aldershot in Hampshire, now produce about 200,000 birds a week. The Aldershot plant is the newest; costing £300,000 and covering an area of 31,000 sq. ft., it was opened last November and is claimed to be the most advanced poultry processing factory in Europe, if not the world. The largest in Britain, its present output is 60-70,000 birds a week, and the company hope that eventually it will be producing 300,000 a week, with an ultimate staff of about 300 people.

The start of the broiler business in this country dates from the lifting of wartime poultry-feed restrictions in 1953. The Buxted Company started in May, 1955, when two poultry farmers, Mr. Anthony Fisher and Mr. Tony Pendry, who unknown to each other had been rearing their birds only a few miles apart in Sussex before they were introduced by a mutual friend, began processing their chickens in what was little more than a Dutch barn. These farmers were among a small group which in 1953 began to rear chickens by intensive indoor methods developed in the U.S.A., and it is this method of rearing which is the foundation of the industry. Today the company controls, besides the three packing stations, two hatcheries, experimental farms, an advisory service and a marketing organisation, and draws its supplies of chickens from 150 large-scale chicken farmers in south-eastern England, who are provided with day-old chicks from the company's hatcheries.

The company's products are all quick-frozen, oven-ready 10-week-old birds weighing between 2 and 3½ lb.

Novel features

Noteworthy points of the new plant are the mechanical poultry handling equipment, British-built to American design, new chicken handling techniques developed in collaboration with the Low Temperature Research Station at Cambridge and which result in ex-

(*Left*): **This worker is presenting each carcase in turn to a quill-pulling machine which removes the large flight feathers.** (*Right*): **The carcases then go to plucking machines, one of which is seen here, in which flexible fingers fixed to revolving shafts pull off the remaining feathers without bruising the carcases.**

tremely low bacterial levels on the carcases, and the sewage disposal plant. The last is an important feature; as can be imagined, the problem of disposing of effluent water containing offal residue and feathers is formidable, for it cannot be put into the corporation sewer as it is. This sewage disposal question was one of the factors considered when the location of the factory was decided, and the site chosen was only 500 yards from a sewage farm.

Sewage disposal

Separate from the main factory is a brick pumping house containing a small water chlorination plant, a pump house for pumping water from the storage tanks (outside the building) to the factory, and a sewage house containing a separating pump in a pit into which all effluent and waste water is discharged. The waste amounts to 4,000 gal. per day, and this is pumped by means of a special pump through 10 in. asbestos piping to the sewage farm.

Processing of chickens

Live chickens are delivered from the farms by lorry in loads of 2,400 at a time; they are housed in crates designed in collaboration with the R.S.P.C.A. which hold a dozen birds each. The crates are taken off the lorry and placed alongside an endless overhead-roller conveyor. This comprises a single tubular track from which the load-bearing frames, linked together by endless chains, are suspended, each frame running on a pair of nylon rollers. This method is found to be hygienic and the components are unaffected by frequent washing down.

The birds are taken out of the crates by the legs, which are attached to shackles hanging from the conveyor. Squawking loudly and fluttering their wings the birds hang upside down as the conveyor moves along, but before a few seconds have passed they are put to sleep by a humane electric stunner applied to their heads. They then pass to another operator who cuts the throats, and the birds travel over a bleeding trough while the carcases are emptied of blood.

Still on the conveyor, the carcases pass through a scald tank, which loosens the feathers. As they emerge from the tank, an operator presses each carcase in turn against a quill-pulling machine, which removes the flight feathers. The carcases then pass through two plucking drums head downwards, where some of the feathers are removed; they are then reversed on the conveyor and pass through two more plucking drums feet downwards, where the rest of the feathers are taken off.

After being stunned electrically (*left*) the birds' throats are cut and they are conveyed continuously over this trough during bleeding (*right*).

After the feet are sheared off by hand, the carcases travel to the eviscerating line, where the inwards are removed in the following order. First the neck flap is freed and the crop removed, then the carcases are suspended three-point fashion (by neck and both legs) to facilitate the next operation, which is the removal of the back end. The gizzards are pulled out, split and washed; the livers are removed and examined, the bile duct and spleen are separated and thrown away. Inedible offal is put into stainless steel channels where a continuous flow of water washes it away. It is sold for animal feed. Edible offal after examination is wrapped separately and put back in the washed carcases.

After the heart and lungs are removed, the carcases, again hanging head downwards, pass to an automatic guillotine which removes the heads. The necks, hearts, livers and giblets are cleaned and wrapped.

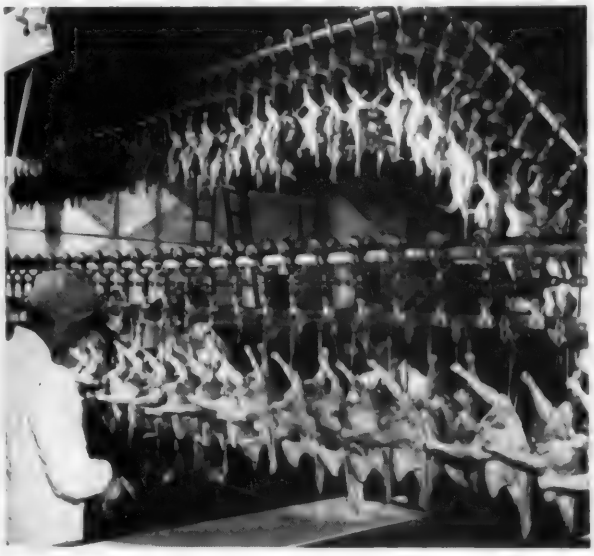
A worker trims off the feet with a pair of shears. Note the stainless steel holders by which the carcases are suspended from the overhead conveyor.

Chilling and wrapping

As only a few minutes have elapsed from slaughtering to this point, the carcases are still warm, and they are now chilled in a spin chiller, which consists of a stainless steel drum revolving in a tank of water which is chilled by the addition of flake ice. This ice is produced adjacent to the chiller by an automatic ice-making machine and stored in insulated bins.

The carcases are fed in at one end of the drum, whose motion causes them to pass to the other end, where they are once again hung from an overhead conveyor. The water absorbed in the chiller drains off as the carcases move slowly along the conveyor, which is deliberately made to take a longer route to allow this draining to take place.

The draining conveyor takes the carcases, at about 40°F., to the trussing and wrapping lines, where women workers unhook them, insert the wrapped inwards, truss the birds and put them into bags of transparent film. These are evacuated by suction nozzles, and the necks twisted and sealed with a sealing machine.



This picture, taken in the trussing section, clearly shows the arrangement of the overhead conveyor, which has nylon rollers moving along a monorail.

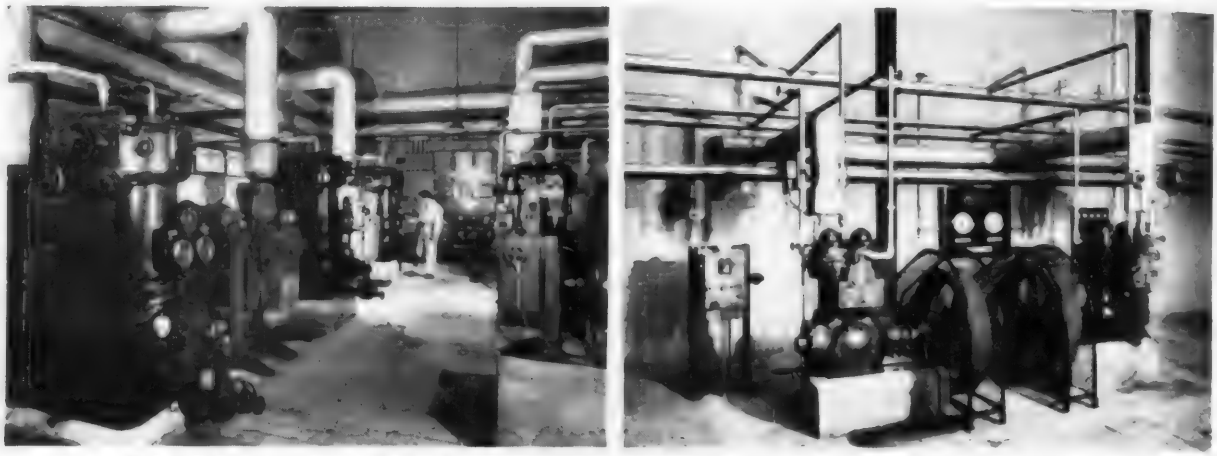
Freezing

The wrapped and labelled birds are placed on tiered trolleys which are then transferred to the two 60 ft. freezing tunnels. Freezing is carried out in these tunnels by air blast; finned evaporation coils are installed in each tunnel and operate on the ammonia pump circulation system, the air being circulated by double inlet fans driven by vee belts. The temperature of the air delivered to the birds is −40°F., and freezing time is 2-2½ hours.

As the loaded trolleys are fed into the tunnel, the operator presses a button which starts up a short conveyor, and as the trolley moves along it pushes those already in position and keeps the whole lot moving. When any trolley reaches the end of the tunnel, a trip is automatically operated and a similar conveyor projects the trolley forward ready for removal of the birds to the cold store.

Refrigeration equipment

The refrigeration equipment for the tunnels comprises a two-stage ammonia compressor plant, the



Left): **A view of the compressor room of the refrigeration plant, showing the high and low stage compressors for the freezing tunnels.** (*Right*): **The two 5 × 5 in. ammonia compressors for the cold store.**

low and high stages being separate to provide flexibility for load variations. Low stage compression is produced by three 15 × 10 in. vertical single-acting ammonia booster compressors, while two 9 × 9 in. twin-cylinder compressors provide high stage compression.

After freezing, the birds are packed in cartons and transferred to a cold store where they are held for a short time at a temperature of −5°F. The plant for this comprises two 5 × 5 in. twin-cylinder vertical single acting ammonia compressors.

Condensers, common to freezing tunnel and cold store duties, comprise a battery of forced draught evaporative type units mounted over a concrete water cooling tank situated outside the plant room.

The ice-making plant is operated from a 10 h.p. separate compressor unit.

(*Left*): **A trolley-load of birds coming out of one of the freezing tunnels.** (*Right*): **This girl is heat-sealing the neck of a plastic bag (into which the girl in the background has placed a weighed bird) which she has just evacuated with the suction nozzle shown.**

Main outlets

Branded chickens under the company's name are marketed in south Hampshire and the north-west of England, delivery being made in the company's own fleet of insulated vehicles. In London and the home counties the company supplies a well-known multiple retailer.

The Aldershot factory has been planned to allow for considerable expansion, and the floor area, stores, plant rooms and machinery are designed accordingly. It will shortly be processing about half the company's birds.

Hygiene

The poultry processor's worst enemy is disease, and the company suffered a setback during the recent fowl-pest epidemic, which caused the loss of thousands of birds and severely curtailed the supply for a time. To guard against the spread of disease, all the crates in which the birds are delivered to the factory go immediately after being emptied to an automatic crate washer, which sterilises them before they are sent back to the farms. We were told that during the planning and proving runs of the new factory, much valuable assistance on the bacteriological side was given by the staff of the Low Temperature Research Station, Cambridge.

SOME SUPPLIERS OF EQUIPMENT

Elliott Bros. (London), Ltd.: temperature measurers.
Gordon Johnson-Stephens, Ltd.: poultry processing plant and conveyors.
York Shipley, Ltd.: refrigeration plant and ice-makers.

▶ A recent issue of *Space*, published by the Hyster Co., gives details of their *Monotrol* system for lift truck control.

How Wall's Sausages are Made

Quality and hygiene given top priority in Willesden factory

Our recent comment that sausages produced in this country sometimes leave something to be desired did not, of course, refer to the products of reputable makers whose manufacturing methods and quality standards are above reproach. We were invited to see for ourselves how sausages are made at Wall's London factory, and this article gives our impressions and shows how this firm's standards might well be cited as an example of how things should be done.

THE story of Wall's starts in the reign of George III when Richard Wall, after serving an apprenticeship in St. James's Market, established his own business as a butcher in Jermyn Street in the West End of London. The shop is still owned by Wall's, and in it was born in 1846 Thomas Wall, grandson of Richard and the man who set the pattern for Wall's as it is today. He died in 1930.

In the days of Richard Wall, the cellar of the shop housed his bacon curing tanks and the treadmill worked by a donkey which turned the sausage-grinding machinery. The sausage and pie-making activities were transferred early in the present century to a factory in Battersea, but this soon became too small, and in 1919 Wall's established themselves at "The Friary" in Acton, the name being derived from a monastery which in ancient days was on the site.

Sausage making was mainly a winter business, and the idea was conceived of making ice-cream to provide occupation for the summer months. Today, the two activities are year-round enterprises run by the two companies which were separated in 1955, and now entitled T. Wall and Sons (Meat and Handyfoods), Ltd., and T. Wall and Sons (Ice Cream), Ltd. Both companies are responsible to the parent organisation, which is part of the Unilever group.

Sausage ingredients being mixed and chopped in a bowl chopping machine.

The Willesden factory

This factory, which dates from 1938, was described in our issue for May, 1958, p. 185. That article was chiefly concerned with the new extensions which were opened by the Duke of Edinburgh in February, 1958, and which included the abattoir, capable of handling over 300 pigs an hour, and the extensive mechanised handling equipment to assist the processing of the large quantity of meat dealt with by the factory.

Our latest visit was concerned mainly with sausage production, which forms only a part, although a very important one, of the factory's various activities, which also cover meat pies, bacon and other products of the pig. The varieties of meat product manufactured by Walls are, of course, many, and of the sausages alone there are the standard eight-links and chipolata, as well as skinless in both beef and pork, cooked luncheon and liver sausage. Walls say that they were the pioneers of branding and hygienic pre-packing of sausages.

Company policy

The firm's object is to produce a quality product of consistent character which pleases the majority of consumers. This aim is achieved with a large output, by careful selection of raw material, standard production techniques and rigid quality control at every stage. Their aim is to get their products into the consumer's hands not later than the day following manufacture; retailers are, therefore, discouraged from holding more than 24 hours' stock. Retailers whose premises do not conform to the minimum standards which Walls consider necessary for the maintenance of product quality are not supplied.

(*Left*): **Sausage meat being filled into cellulose casings.** (*Right*): **These racks hold the sausages during the cooling process.**

The Walls pig

In order that the public can come to expect an unvarying consistency in flavour and quality, standard specifications have to be laid down right from the start of processing, namely the pig. All the pigs that Walls buy are supplied by regular producers, some 60% of whom have a contract with the firm. The live weight required is 260 lb., which is some 60 lb. heavier than the standard baconer, and this supplies fresh, cured and manufacturing meat. The firm say that this heavyweight animal reared on *ad lib.* feeding principles and reaching slaughterweight in almost the same time as a restricted-fed baconer provides the tender and succulent meat required for good quality products more economically than the traditional Wiltshire type. Meat for lean bacon is defatted before curing, so that the ratio of lean to fat meat is always constant; legs and a good proportion of shoulders, too, are defatted, providing a consistent lean product. The fat trimmed off is used together with lean cuts and trimmings in sausage manufacture, and also in pies and pastry.

Pigs are bought within a radius of 100 miles of the factory and are brought in by road in transport arranged by the firm. Beef, veal and mutton are also bought daily at Smithfield market and brought to the factory in the firm's own vehicles in which the carcases are hung from rails and not stacked in heaps.

How the pig is divided

The pig is divided into three main cuts, the leg, the middle and the shoulder. The legs provide defatted ham and gammon bacon and fresh pork; middles comprise back and belly, the former, after trimming as already mentioned, being turned into lean bacon, and the latter, which is not defatted, furnishing streaky bacon. Shoulders provide meat for curing and manufacturing (sausages and pies) and fresh pork cuts. The head provides mainly canned and luncheon meat.

A heavy pig of 210 lb. deadweight provides about 150 lb. (excluding fillet and flare) of usable meat, which Walls use approximately as follows:

meat for curing and/or fresh meat	—87 lb.
meat for manufacturing	—63 lb.

Sausage manufacture

The earliest known recipe for sausages occurs in a cookery book published in 1450. Sausages in those days were called "weasels," after the animal whose long thin body they resembled, and the recipe reads as follows: "First, grind pork, temper it with eggs and powder of pepper and canel; close it in a capon's neck or pig's paunch; roast it well, and then varnish it with batter of eggs and flour, to serve in hall or else in bower."

Walls claim that their recipes date from a time even earlier than when Thomas Wall was making sausages for Queen Victoria, although their methods of manufacture have changed since then. Sausage production is spread over part of three floors; storage and despatch on the ground floor; pork meat preparation on the first; and pork sausage manufacture on the second. Beef sausage manufacture for the south of England is carried out at the firm's recently acquired Hayes factory.

In the spice preparation department, the spices and seasonings are weighed out by hand, ground and mixed, and put into bags, each bag containing the right amount for one batch of a chopping machine. Cereal is conveyed by elevator to a weighing machine and weighed into aluminium trays, each containing enough for one chopping.

On the floor above, pork manufacturing meat is prepared and the correct amounts of lean and fat are weighed into the aluminium trays which have come up from the floor below on an overhead conveyor.

Chopping

Each set of trays now contains the ingredients for one batch of sausages, and are elevated to the sausage preparation department on the floor above. In this department, the heart of the production

(Left): **A line of coolers on the sausage preparation floor. On emerging from the coolers, these women check the weights of the bundles of sausages, then place them in containers ready to be taken to the packing section.** *(Right):* **One of the packing tables where the sausages are wrapped in transparent film.**

line is the bowl-type chopping machine, of which there are a number in a double line along the floor. Each machine is under the charge of one operator, whose skill and experience is necessary to ensure the quality of the final product, for the chopping operation must not be too short or too long, and the ingredients must be added in the correct order and at the right time.

Each chopping machine is loaded to a batch weight of 105 lb., and during the chopping operation the operator adds the correct amount of water and a small amount of edible colour. When chopping is complete, the operator loads the chopped meat into the hopper of a filling machine alongside. There are two types of filling machine, a continuous automatic filler and a plunger type, but in both the meat is extruded from a nozzle over which has been placed the prepared casing. For the manufacture of traditional skin sausages, the fillers are operated by women who pass the filled casings as they come off the nozzle in long lengths to other women who weight them and divide them into lengths which, when allowance is made for loss of moisture during cooling and evaporation before sale, will provide 1 lb. packs of sausages.

The weighed lengths are then passed to other workers who by twisting form the links and bundle the sausages ready for cooling. The bundles are suspended from hooks on a conveyor and are taken continuously through coolers, where not only are the sausages cooled but their surplus moisture is removed at the same time. On emerging from the coolers, the sausages are removed from the hooks, reweighed and packed by hand in transparent film carrying the Wall's brand name.

Both pork and beef sausages are made in standard eight-link and chipolata sizes, the former having casings of pig gut and the latter cases of sheep gut. Skinless sausages are also made.

Skinless sausages

These are chipolata-type sausages sold at a slightly cheaper price than the ordinary chipolata. The ingredients are prepared and chopped in the same way as for the ordinary kind, and the meat is extruded in the same way, but into 40 ft. lengths of synthetic casing instead of into natural gut. The filled casing is then passed through a machine known as a *tylinker*, which binds the casings at regular intervals and ties each link with a short length of string. The links are then put through a process which forms them into firm sausage units.

Dipping in hot water and then in cold serves to make firm the surface of the sausage to enable it to keep its shape when the casing is stripped off.

Stripping is a simple operation carried out by pulling the string of sausages through a short length of metal tube in which a knife blade is mounted. As the sausages are pulled through, the knife blade slits the casing and the individual skinned sausages fall into a receptacle. They are taken out and put into trays which hold exactly 16 sausages, and thus the sorting of sausages into lots of 16 ready for packing is a simple procedure by this means. The trays are emptied out on to prepared sheets of branded film and wrapped by hand.

From the preparation department, the packed sausages go to chill rooms on the ground floor to await despatch.

Casings

The amount of natural casing obtained from their own abattoir is only a small proportion of Wall's requirements, and most casing material is obtained from suppliers. All available casing is used however, and is first cured by immersion in salt before use.

After curing, the gut is soaked in water and then threaded on to

Skilful fingers twist lengths of filled natural casing into bundles of sausages.

spools with the aid of a spooling machine. From the spools the lengths of gut are loaded on to the extrusion nozzles of the filling machines.

Quality control and hygiene

The quality control department operates at all stages of processing, and random samples are taken from the production lines to be checked for weight, flavour, correctness of packing, bacterial count, chemical analysis, etc. A research department is continually at work on new products and new methods of producing established ones.

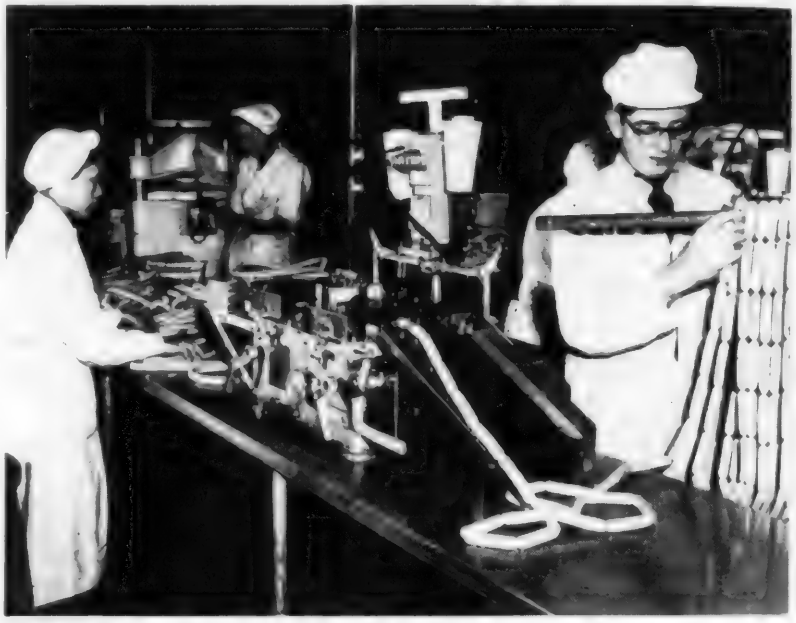
Carcase inspection is carried out by both the firm's own inspectors and by local authority officials. Any carcase suspected of disease is removed from the production line, and if disease is confirmed, the affected carcase or organs are sent away for conversion to inedible products.

Hygiene precautions are stringent; for example, all persons entering the meat preparation departments, visitors as well as workers, are required to apply bactericidal cream to their hands from dispensers which are conveniently sited at the entrance to the departments.

A business which started as a shop in 1786 can only grow to an organisation supplying the country with more than 1,500,000 lb. of sausages and 1,300,000 pies every week if the quality of its products is exemplary, and at Willesden we saw for ourselves the extreme care which is taken at every stage of processing, from the time the pigs enter the pens in the abattoir to the final despatch. The company's vigilance does not end there, however, and it has been explained how Wall's interest in the handling and storage conditions at the retailers ensures that their products arrive in the customer's hands as speedily as possible and in as fresh a condition as modern science can make it. We are glad of the opportunity given us to see this modern factory where the sausage is indeed taken seriously.

SOME SUPPLIERS OF EQUIPMENT

Abattoir Appliances, Ltd.: slat conveyors.
J. and E. Arnfield, Ltd.: mono-fillers.
Forgrove Machinery Co., Ltd.: wrapping machines.
J. and E. Hall, Ltd.: sausage coolers.
George W. King and Co., Ltd.: sausage raw materials conveyor.
Tylinker, Inc.: tylinkers.
J. C. Wetter and Co., Ltd.: bowl choppers and fillers.



The manufacture of skinless sausages. In the background, lengths of synthetic casing are being filled with sausage meat; the casing is then fed into a tylinker machine which twists and ties it at intervals. The tied links are then hung on racks prior to soaking in hot and cold water and removal of the casing.

◀ The makers of *Eel* photo-electric instruments, Evans Electroselenium, Ltd., have published a series of leaflets entitled *Instruments in Industry*. These offer a comprehensive guide to determinations which can be achieved by those instruments applicable to the industry concerned.

This company has also produced a series of detailed method sheets for use with the *Eel* absorptiometer, the *Eel* flame photometer and the *Eel* colorimeter.

Polish Food-processing Machinery

New developments in the food machinery and fish handling industries in Poland are described in these two articles, which are abridgements of recent literature.

FOOD production has played a consistently important role in Polish economy throughout the post-war period, with increasing emphasis being placed on the development of a modern processing industry. Thus in 1957 the food industry accounted for 30·5% of the total value of Poland's industrial production, and food exports represented 19% of the overall value of exports.

While production of certain foods for home consumption or export, particularly meat, grain, dairy products and sugar, is a long-standing tradition, the large-scale processing of food is only now being developed to any considerable extent, and it is only in the past few years that Poland has begun to manufacture food-processing machinery.[1]

Boning hams before packing into cans in a Polish canning factory.

Machinery association

The design and manufacture of such equipment is mainly under the auspices of the Ministry for the Food Industry (certain machinery, mainly for the sugar, milling, meat and dairy industries, is also manufactured by co-operative enterprises and by factories within the organisation for heavy industry). There are twelve establishments supervised by the Ministry for the Food Industry making food-processing machinery, and they are grouped in an "Association for the Building and Installation of Machinery for the Food Industry."

This organisation is responsible for about 70% of the country's total output of food machinery. It undertakes production of complete machines and spare parts, and supervises installation of plant, while its Central Construction Bureau is responsible for designing new machinery, building prototypes, and testing equipment. In all, some 120 types of basic machines for food processing are now manufactured by factories in the association, and each year about 30 new types of equipment are added to the list. Great emphasis is placed on consultation with the research institutes of the food industry and heavy industry, as well as with food technologists from the factories, at all stages in the development of new machinery.

Equipment now being manufactured covers a wide range of processes, both in those branches which are traditionally important like meat products and sugar refining, and in those where raw materials are plentiful but where processing has hitherto been on a very limited scale, such as fruit and vegetable products, and confectionery.

Sugar

Sugar beet is one of Poland's major industrial crops. Domestic industry is now producing beet cutters, reservoirs for beet pulp (daily capacity 4,500 kg.), rinsing plant working at a pressure of 12 atm., high speed heaters with a heating surface of 100 sq. m., and automatic sharpeners for the knives of mincing machines.

Confectionery

Polish sugar confectionery is generally of good quality, but output is fairly small and techniques rather backward. In an attempt to improve the position, various

types of equipment are now being manufactured. These include plant for moulding caramels with an output of 1,000 kg./hr., and for moulding drops with an output of 150 kg./hr. machinery for drawing caramel mixtures (30-40 r.p.m.), and tables for heating and cooling caramels.

Fruit and vegetable processing

This too is a branch that has hitherto suffered from lack of processing capacity. Equipment now available includes "swan neck" conveyors with a capacity of up to 4,000 kg./hr., screw conveyors for soft fruit, vegetable cutters (yield 250 kg./hr.), vegetable scrapers (600 kg./hr.), apple peelers (dealing with 120-200 kg. of fruit per hour), 100 kg./hr. tomato pulpers, two-stage sieving machines for tomato purée (1,000 kg./hr.), universal sieving machines (1,000 kg./hr.), autoclaves for canning, cherry stoners (200 kg./hr.), vacuum heaters for preparing conserves and for condensing tomato purée, and washing plant for hard and soft fruit.

Meat industry

The emphasis here is on complete production lines, such as a plant capable of dealing with 200 head of cattle per eight-hour working period, which consists of abattoir, automatic loading plant feeding carcases to conveyor line, saws for removing horns, skinning installations, and machinery for cutting up fat, the whole being linked with a continuous conveyor system.

Other equipment

Machinery produced for other branches of the food industry includes potato graters with a capacity of 7 tons/hr., vacuum dehydrators for starch (1,500 kg./day), apparatus for testing the seal of barrels, egg sorting plant capable of sorting, stamping and checking the freshness of 6,000 eggs/hr., mixers for curds (150 kg./hr.), semi-automatic butter formers, and a 120 litre/hr. milk separator.

Recently introduced equipment includes lines for sterilised bottling of wines and fruit juices (4,000-6,000 bottles/hr.), for the production of pickled gherkins (1,000-2,000 kg./hr.), and for the manufacture of natural tomato juice (2,000 l./hr.). The increased output of the brewing industry will shortly be assisted by an automatic bottling line capable of handling 4,000-6,000 bottles/hr., and automatic plant for tarring barrels is also going into production.

The manufacture of food-processing machinery in Poland has now reached a point where the industry can look forward to exporting not only individual items of machinery and equipment, but also full production lines and even complete plant, on an increasing scale.—N. E. ORNA.

Fish Processing in Poland

CONSIDERABLE progress was made in the first seven-year planning period, 1950-56, in the provision of cold storage for food, in two main groups, of which the first comprised fish and the second most other perishables such as meat, milk products, fruit and vegetables. This division coincided, too, with state organisation of the food industries under two ministries with their respective planning and constructional departments. Besides the differences in design of cold storage inherent in the two groups, of fish on the one hand and other foods on the other, many others arose through such dual authority.

Cold storage

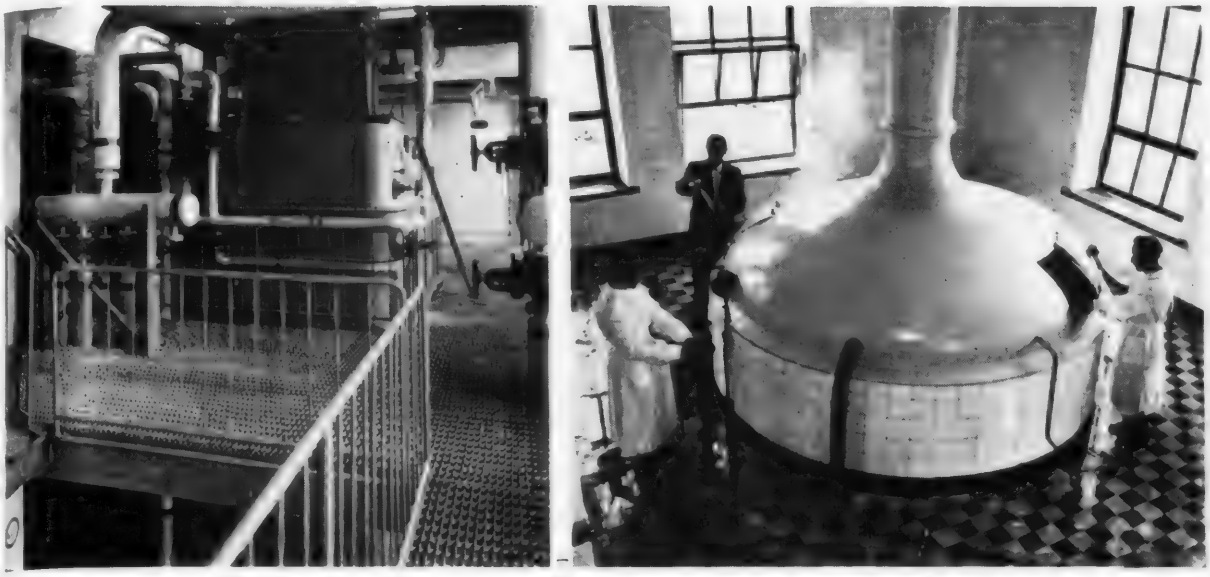
Although floor-space and cubic volume for fish were much less than for meat, etc., the cold storage problems in this case were of special interest, and offered many unique features both from a technical and economic point of view. A single organisation was established in Gdynia to deal with most of the work of design and erection of plant and equipment, both in the actual cold stores and in auxiliary lines such as transport, ice production, insulation problems, tinplate supply, and so forth.

After the more urgent needs of cold storage had been to some degree provided for, the Gdynia firm, that had meanwhile expanded on a large scale, turned its attention to exports to China, Bulgaria, and other countries; and to the construction of cold storage for ships, ports and harbours, and railways, including such Baltic ports as come under Polish control. Cold storage here, for sea-fish, fulfilled a variety of needs going much beyond those usually associated with this particular field of food preservation. These developments ran parallel with those of the sea fisheries and the fish trade as a whole.

Modern fishing fleet

The fishing fleet, built in Polish ports, possesses today all the most modern and efficient equipment, and comprises small craft of 17 m. and 24 m. steel cutter kind, as well as large luggers and trawlers and parent ships equipped with refrigeration and cold storage. These latter can serve also as supply ships for those operating in North Sea high latitudes for weeks at a time.

Prior to the first period plan (before 1950) the existing cold stores were reconstructed and modernised, and the experience thus gained applied in the new buildings. By way of example the fish store at Stettin may be mentioned. This was first commissioned for cold storage in 1948,



These pictures show that Polish equipment is up-to-date and modern. (*Left*): A plant for producing edible fat in Klemensow. (*Right*): A brewery in Bialystok.

with 3,000 sq. m., and is the third largest in the country after Gdynia (4,000 in 1950) and Swinemünde (4,600 in 1953).

Fish processing

At Stettin a processing room (*Manipulationshalle*) has been built for preliminary treatment of the fish, with an ice store above, where, for the first time, a roof-high capacity evaporator has been tested, and later installed in all new construction. Two fish freezing plants have also been provided: one brine and the other tunnel. The brine plant intended for the smaller kinds of fish and fillets, with a capacity of about 35 tons/day, also served, with little or no change, as a model type for new installations. A standard type of tunnel plant has been developed from the other.

About the same time cold storage was established in other fishing ports — Leba, Rügenwalde, Kolberg, etc., or existing small ones enlarged; and on Wollin island a small one-storey building was erected especially for freshwater fish. In the article by Engineer T. Skwarczynski, of Mannheim, from which most of these details are taken,[2] details are tabulated of the ten principal new cold stores and five fish-market (*Fischhalle*) installations, together with illustrated descriptions of plant. The different kinds of refrigerating and cold-storage equipment, number of stages, temperature range, down to the lowest deep freeze, are also fully described, including names of suppliers, that may be German, Polish, French, British, etc.

For transport, the most commonly used packing for all kinds of frozen or ice-packed fish are wooden lattice boxes and plastic or cardboard cartons. Frozen fillets are packed in these latter. For vertical hoisting from one storey to another, containers holding up to 3 tons may be employed; and for horizontal travel rubber-wheeled runabouts are found most convenient, up to 2½ tons capacity.

The ice-making plants, *e.g.* at Gdynia and Swinemünde, have mostly American boxes or cabinets for 135 kg. blocks, requiring less labour than the smaller earlier used 25 kg. boxes, a matter of importance in cases where 100 tons of ice must be bunkered at short notice. At Gdynia the ice may be sent to two ice mills, part for use on ships and part for other purposes.

New port

Despite the progress made in this first stage of installing cold-storage and freezing equipment, much yet remains to be done in the second stage of transport to the consumer, in which chain there are many links. Moreover the fish catch very often exceeds the available freezing plant. So this must be further enlarged, and advantage taken of all the technical improvements that have been developed during the past two or three years, such as electrostatic fumigation, the use of alginates in freezing and of sulphonamides and antibiotics in fish conservation, and new fish-processing machines.

As a result of much study of these new developments, and many visits abroad, the Polish State Fisheries Inst., Gdynia, in 1957, introduced the preliminary plans for a large new fisheries port at Wladyslowow. Construction is well on the way, but apparently the final decisions have not yet been taken. The new port is intended for dealing with 3,000 tons of fish per day. The new harbour is to be large enough for the movements of 350 fishing cutters. All the plant for preliminary treatment, processing, cold storage, freezing, etc. is being housed in one large building fully equipped with the necessary conveyor belts, hoists and other transport means.

Half the refrigeration equipment

(*Concluded on page 261*)

WORLD FOOD SUPPLIES—5

Standards of Nutrition – II

By Francis Aylward, Ph.D., D.Sc., F.R.I.C.

Revision of dietary standards may be necessary in the light of the most recent evidence discussed in this article, which shows that the problem of nutrition is more complicated than was once thought, especially as the human body is remarkably adaptable to wide variations in nutrient intake.

RATHER similar conclusions emerge from the investigations of Nicol[19] on peasant communities in Nigeria. His reports deal with energy as well as protein requirements and include a critical account of methods available for survey and analytical work. He notes that the overall incidence of clinically detectable "protein malnutrition" is low; among children up to nine years old the figures were 2·2% in one community and 5·3% in another; among those over nine years old he found only one case. Nicol, in summarising his work states: "it is noteworthy that so little difference was found between the clinical conditions of two groups of African peasants whose diets supplied on the one hand a daily average of 85 g. of protein (score 77 on the F.A.O. amino-acid pattern) and on the other hand 51 g. (score 50). It seems reasonable to assume that 51 g. of protein (score 50) is satisfactory for normal adult maintenance in such rural tropical communities. It seems justifiable to conclude that the safe practical allowance of dietary protein suggested by the F.A.O. Committee on Protein Requirements (1957) is unnecessarily high.

As a result of experimental work on the quality and quantity of protein required by man, there is now a substantial body of scientific workers in different countries who challenge the benefits of some of the changes in dietary patterns described earlier and who suggest that in some countries, or within some groups in some countries, the change has gone too far.[31] It is possible to accept the evidence for "protein malnutrition" in Africa and elsewhere and at the same time to believe with Magee and his colleagues of the (U.K.) Ministry of Health that: "The many statements that have been made that definite amounts of proportions of *animal* protein are essential for good nutrition are not supported by any experimental evidence."[34]

These findings are of great significance especially when their economic implications are considered. The relative expense of animal compared to plant foods is something more than an accident of trade; it springs from the fact that even the best of domesticated animals, the pig or the lactating cow, is an inefficient machine for the conversion of vegetable to animal food. The efficiency of conversion is rarely more than 20% and is often less.[31]

Mixed proteins

The newer outlook has been well expressed by Booher of Minnesota, in an important paper[31] which reviews with ample references to original sources, the biochemical and economic aspects of food proteins. Many other scientific workers in the United States and elsewhere have also proposed that fuller use be made of vegetable proteins (such as those from soya and other crops) and also of yeast protein, and have shown how the nutritional value of cereal foods can be improved by the incorporation of relatively small amounts of protein supplements.[25, 26, 43, 53] Thus McCay of Cornell University in co-operation with the New York State Board of Health and School Health Authorities, has advocated the use of bread "triple-enriched" by soya, wheat-germ and dried milk.

Important work has been carried out in both the U.K. and the U.S.A. on the use of dried yeast as a supplementary food (to supply vitamins as well as some protein)[34] and the modern scientific and medical outlook may be seen in the fully documented report of the Medical Research Council on the preparation of milk substitutes for infant feeding.[22]

This re-emphasis of the value of vegetable proteins is not to be regarded as a plea for "vegetarianism," but it may be well to remember that whereas in western countries, most people like to eat some meat and dairy produce, this is not universally true. An Indian writer has commented on the fact that whereas in Britain vegetarians are in a small minority and are often regarded as cranks, in India, where many millions of the inhabitants for religious or other reasons are vegetarians, this dietary practice cannot be dismissed as just a fad.[3]

3. Other nutrients

It is impossible to discuss in detail the very large number of investigations on the requirements for minerals and accessory factors,

A picture of hunger. Chinese beggars surround a vehicle in Chiyang, Hunan province.

but the problem may be illustrated by considering the element calcium, which as a major constituent of bone and other tissue, has been investigated perhaps more thoroughly from the biochemical and nutritional standpoint than any other mineral. Yet in spite of many hundreds of clinical and laboratory reports on experimental animals as well as man, there are still important gaps in our knowledge and disagreements among research workers.

Walker of Johannesburg has published accounts of his own investigations and has included a critical survey of various statements in the literature of calcium metabolism.[57] He concludes that although "it is widely believed that a low intake of calcium can cause or predispose to the development of rickets," from his results "there seems to be no evidence that a low calcium diet promotes, still less causes, rickets." He adds that "it would seem wholly unwarrantable to list prophylaxis against rickets as a reason for insisting on the high intakes of calcium at present recommended." In other papers Walker presents evidence against other claims that have been made in favour of high levels of dietary calcium.

Other reports old and new deal with the problem of calcium levels. Several authors have pointed out how errors may occur in the calculation of dietary intakes by neglecting the calcium present in drinking water or in water used for cooking; thus Murray has suggested that hard water may contribute up to 200 mg. of calcium per day.[58] Over twenty years ago (in 1938) the Advisory Council of Nutrition for the Commonwealth of Australia reported: "an unduly high standard of mineral requirements has been set by overseas workers." The application of certain U.S. standards to the dietaries of families in the capitals of the Australian states, indicates that only 3% were satisfactory in calcium intake, a figure which is absurd in a country recognised for its high standard of living and health. Various workers have examined the uncertain foundations (balance experiments) on which standards for calcium requirements have been built[15, 16] and Goldsmith believes that "neither the most satisfactory level of calcium intake nor the optimum level of calcium at any physiological age or stage of man's development is known."[60]

When one recognises the problem of reaching firm conclusions regarding the ideal dietary level of calcium, an element which occurs in relatively few combinations in foods and which can be determined quantitatively without undue difficulty, it is easy to see how problems arise in determining the ideal levels of vitamins and other accessory factors. The picture that emerges is rather similar to that described for protein requirements; as more and more work is done, early concepts of rigid and high requirements are modified and lower figures have become accepted, or at least have been considered as possible or reasonable.[30]

NUTRIENT INTER-RELATIONSHIPS

Although it is still common practice to define food requirements in terms of *classes* of foods such as fats and proteins, it is becoming increasingly clear that we must think in terms of *individual nutrients* (see the table). The exact number of essential nutrients is unknown; future work may perhaps establish the necessity of several trace elements, some of which are already recognised as constituents of enzyme or vitamin systems.[14]

It seems likely, however, that some forty *individual nutrients* are required by man. These nutrients, often in combined form (such as amino acids in proteins; essential fatty acids in triglycerides or phospholipids) are present in varying quantities in many different animal or plant products. Hence it is probable that the average person living on an ample *mixed* diet will consume all the individual nutrients required. On diets which are (a) more limited in quantity or (b) less varied there will clearly be a greater danger of one or more of the nutrients being absent or present in very low amounts.

Recent work has, however, cast doubt on the older concept of *fixed* daily minimum requirements of all

nutrients, firstly because of the increasing number of *inter-relationships* that are being discovered, and secondly because of the recognition of *adaptive processes*.

The complicated matter of inter-relationships has been discussed in several recent reviews (see, for example, the symposium "Recent Research on Vitamins")[14] and two illustrative examples only can be given here:

(i) It has been shown that the requirements of certain vitamins depend on the quantities of major dietary components (cf. Platt).[51] Thus Sarrett and Perlzweig have demonstrated a connection between riboflavin and dietary protein; various authors have found that a diet high in protein increases the need for vitamin B_{12}; much work has been done on the relationship of vitamin B_1 (thiamine) to carbohydrate metabolism.[35, 51]

(ii) Important chemical transformations and inter-relationships between vitamins and amino acids have been demonstrated. Thus it is known that tryptophane, an essential amino acid, can be transformed into nicotinic acid, a member of the vitamin B complex;[35] investigations on fatty livers by Best, Channon and their colleagues led to a recognition of a connection between choline, betaine and the amino acid methionine and to the discovery by du Vigneaud and his associates of the biochemical process known as transmethylation—the transfer of methyl groups between different compounds so that choline can be replaced in part by methionine.[29]

Human adaptation

Many laboratories are now involved in investigations in inter-relationships such as the above and on the inter-relationships between the essential and non-essential amino acids.[11, 42] Clinical workers too are paying increased attention to this matter and are beginning to recognise that the daily requirement of a nutrient such as a vitamin may vary with the composition of the diet as a whole.[14]

It is well known that micro-organisms and lower animals can adapt themselves with amazing rapidity to changes in environmental conditions, and it has long been recognised that human beings also can adapt themselves to external circumstances. The full extent of adaptation has, however, been realised only in the past few years; it is now evident that man can make some highly effective physiological adjustments, enabling him to live on a wide variety of diets which may be qualitatively and quantitatively below the supposedly normal standards.[31]

The laboratory studies of Ancel Keys and his colleagues,[4] and the many field studies in the prisoner-of-war and other camps during and after the Second World War have added much to our knowledge of human adaptation. Nutritional investigation on the people in the "occupied" countries of Europe revealed numbers of people suffering from the classical symptoms of famine, but nevertheless many physicians were surprised to see how well others had adjusted themselves with success to low calory diets. Sir Jack Drummond in his introduction to Key's report on "Human Starvation" referred[36] to the "vital question of adaptation." "It is gratifying that Professor Keys and his colleagues have clearly demonstrated that adaptation to low calorie intakes occurs. The calculation that an economy of the order of 600 calories daily might follow adaptation related to a reduction of weight such as shown by Professor Key's volunteers is certainly compatible with the general picture presented by the populations of the larger towns of Europe, where food restrictions reduced the average energy intake to something between 1,500 and 2,000 calories."

An increasing number of clinical and laboratory workers have drawn attention to the phenomenon of adaptation and to the necessity of a more cautious and a more critical use of dietary standards, both in relation to calories and nutrients such as calcium. No one would seek in a national or international programme to work in terms of minimum "requirements" that are so low as to leave no margin for safety, but the concept of adaptation makes much more difficult both the fixing of minimum requirements and the definition of undernutrition.[30]

Summary

Many recent investigations are likely to affect public health policy both at home and abroad. These investigations indicate that:

(1) variations both in respect to calorie and nutrient requirements between individuals are almost certainly wider than was at one time realised;

(2) although the methods used for surveys of dietary requirements have proved of great value, they involve many assumptions;

(3) the published "standards" for calories are unnecessarily high and need modification especially for tropical and semi-tropical regions;

(4) the "standards" for protein (amino acids), calcium and other nutrients may also be unnecessarily high;

(5) the idea of the primacy of animal protein must now be rejected and many statements regarding the importance of animal protein in nutrition challenged;

(6) qualitative deficiencies of protein may often be made good by supplementation with relatively small amounts of proteins from plants or micro-organisms;

(7) the older rigid concept of fixed dietary requirements must be modified in the light of new knowledge of inter-relationships between nutrients, the extent of individual variations and the possibility of adaptation to diets.

See last month's issue for the references indicated by numbers in the text.

▶ Two leaflets have recently been published by the Cambridge Instrument Co. Ltd.. The first, *List* 144/6 describes a range of indicators, recorders and controllers for use with the Cambridge automatic gas analysers of the thermal conductivity type. Details are also given of units for the supply and standardisation of the katharometer-bridge current. *List* 307/2 gives details of the patterns and ranges of vapour pressure thermometers which are made by the company.

AIDS to AUTOMATION

Accurate control of one or more process variables means a better quality product and is more easily and cheaply done automatically. The small manufacturer as well as the large can often benefit by some degree of automation, and installations and devices small as well as large are reviewed here.

IT is a mistake to imagine that automatic control is restricted to large-scale processes. There are many opportunities for its application to smaller scale operations, resulting in better quality control, greater uniformity of product, and lower operating costs. Many manufacturers cater for the small processor as well as the large, and by the installation of a few comparatively simple devices and instruments, a measure of automation can often be achieved at a cost which will be more than paid for in the benefits obtained.

PROCESSING AIDS

Automatic means of process control vary in size from complete bulk handling installations to simple instruments.

Bulk handling

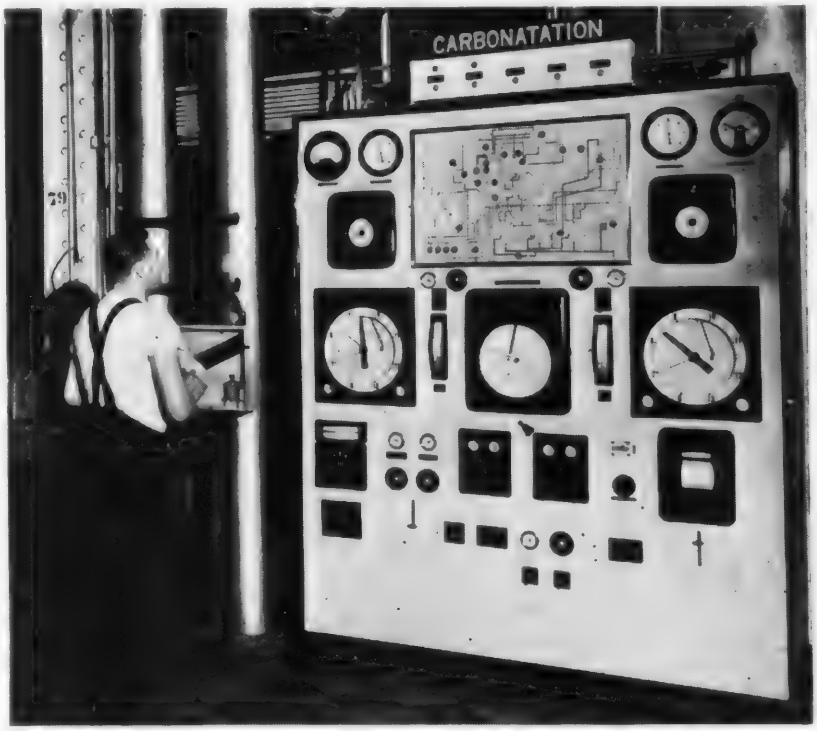
At the top end of the size scale are installations such as those made by Wm. Douglas and Sons, Ltd., a member of the Baker Perkins group, for storing, blending and emulsifying fats and delivering them to mixers in predetermined quantities. One of their installations (at Macdonald's biscuit factory in Glasgow) was described in our issues for December, 1959, and January, 1960.

A typical plant for biscuits fats, where liquid fats are delivered into bulk storage vessels, would consist of a road tanker pump to extract the liquid fats from the delivery vehicle, a pump to draw from any one of the bulk storage vessels when making a blend, mixing and feed vessels, a cooling plant, finished fat silos, a coconut oil silo for creamed fats, and a range of high speed dough mixers. A plant of this type is usually arranged on full automatic control with a main control and sometimes, depending on the size of the plant, a recipe panel at the mixer which can control every operation in conjunction with the main panel room.

By using a changeable plug unit, the recipe panel can be set to the exact quantities of ingredients, sequence of feeding into the mixer and the mixing cycle for any type of biscuit. When the operator is ready to charge the dough mixer he simply presses a button. Every operation of loading the ingredients into the mixer is carried out in strict rotation, and the machine runs automatically for the duration and at the speed for each stage of the cycle. A bell rings when the process is complete. On such a system one operator can deal with up to four high speed dough mixers.

The bulk storage vessels may be placed at any convenient position. Suction plug cocks open and close as required under electric impulse, and the transfer pump starts and stops in harmony. Thus by previously setting the cycle on the control panel, the composition of the blend required is obtained. The blend is then cooled and delivered to the appropriate mixer.

In cases where bulk quantities



An instrument panel in a sugar factory for controlling the carbonatation process.

of such materials as malts and syrups are used, temperature control equipment is supplied. The firm also supplies equipment for warm and cold dough waters, ensuring the exact temperature.

Another firm which supplies large-scale installations is Dunford and Elliott Process Engineering, Ltd., whose rotary louvre continuous dryers, coolers and roasters can be supplied fully automatic in operation, enabling them to operate at preset conditions without manual adjustment. A number of cocoa bean, cocoa nib and nut roasters operating in chocolate manufacturers' works feature continuous impregnation of the cocoa nibs, automatic weighing with remote indication and recording, and fully automatic operation.

Lindars automatic preset metering and weighing systems, say the firm, have a wide application in the food industry where preset quantities, by weight or volume, of liquids or solids or both are automatically delivered as mixtures or blends into a process. For the preset weighing of solids, *Lindars* batch type weighers may be used, or alternatively the *Lindars* automatic digitiser equipment may be attached to dial scales for preset control.

Punched card systems

All the above, together with a process, may be automatically controlled from punched cards, on which may be punched the volumes or blends required, the route of the material through the conveyor plant, and the time or temperature of operation of the individual machines or units. A fully automatic installation controlled by punched card can be operated from a single point. The punched card can, of course, be changed as desired to alter blends, etc.

An added feature of this equipment is that results may be read out individually from the automatic controls in the form of punched card or tape, printed by an adding machine or on tickets for feeding into punched card accounting systems, or alternatively as printed weight or volume tickets, advice notes, etc.

A large Dunford and Elliott control panel complete with external automatic controls for an installation comprising four large sugar dryers and ancillary equipment.

Process controllers

The *Numalec* controller made by the Cambridge Instrument Co., Ltd., is designed to control to a preset programme and record process variables such as temperature, pressure or vacuum. Suitable applications, say the makers, are sterilisation and cooking in canning, and models are available for a very wide range of industrial applications.

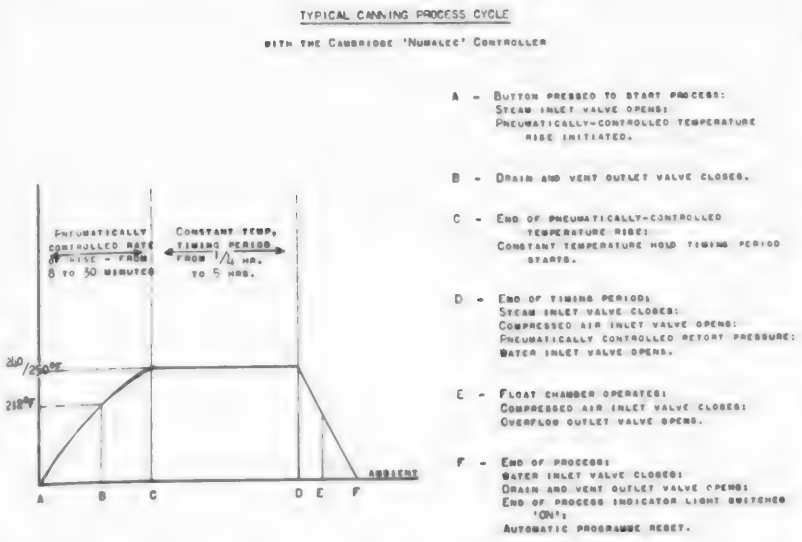
The device is basically an electro-pneumatic controller employing up to two Bourdon-type measuring systems. In its simplest form, it will maintain the temperature of a process at a desired value for a specified time, switch off and indicate the completion of the cycle. With two measuring systems, a recording element and suitable sub-units, the instrument can be made to control up to two separate variables and switch in or out a theoretically unlimited number of separate functions (such as operating a warning light or opening a vent) during the course of the programme, which can last several days. Each system is provided with a separate recorder pen and setting arm for the desired value. Additional contact setting arms are fitted when the function is dependent on the measured value. When the function is time-dependent, the controller is fitted with preset electrical contact timers. All contacts can be made to operate warning lights, regulating units, pilot valves and other positioning devices.

A control element operating on a 20 p.s.i. source of clean dry air provides an output pressure of 3-15 p.s.i., sufficient to operate most types of pneumatic diaphragm valves. When integrated with a process, the controller provides fully automatic action once the starter button is pressed. When the process is completed, the instrument resets itself ready for the next cycle.

Automatic sugar extraction

A sugar beet processing plant of the Irish Sugar Co. at Carlow, in the Republic of Ireland (see

The Cambridge "Numalec" Process Controller controls either simple or complex programmes, recording variables and indicating the commencement of each stage.


TYPICAL CANNING PROCESS CYCLE
WITH THE CAMBRIDGE 'NUMALEC' CONTROLLER
A - BUTTON PRESSED TO START PROCESS: STEAM INLET VALVE OPENS: PNEUMATICALLY-CONTROLLED TEMPERATURE RISE INITIATED.
B - DRAIN AND VENT OUTLET VALVE CLOSED.
C - END OF PNEUMATICALLY-CONTROLLED TEMPERATURE RISE: CONSTANT TEMPERATURE HOLD TIMING PERIOD STARTS.
D - END OF TIMING PERIOD: STEAM INLET VALVE CLOSED: COMPRESSED AIR INLET VALVE OPENS: PNEUMATICALLY CONTROLLED RETORT PRESSURE: WATER INLET VALVE OPENS.
E - FLOAT CHAMBER OPERATES: COMPRESSED AIR INLET VALVE CLOSES: OVERFLOW OUTLET VALVE OPENS.
F - END OF PROCESS: WATER INLET VALVE CLOSES: DRAIN AND VENT OUTLET VALVE OPENS: END OF PROCESS INDICATOR LIGHT SWITCHED 'ON': AUTOMATIC PROGRAMME RESET.
PNEUMATICALLY CONTROLLED RATE OF RISE - FROM 8 TO 30 MINUTES
CONSTANT TEMP. TIMING PERIOD FROM 1/4 HR. TO 5 HRS.
240/250°F
212°F
AMBIENT
A B C D E F

December, 1959, p. 449) operates under automatic control and processes 125 tons of sugar per hour. Instrumentation was carried out by Honeywell Controls, Ltd., who say that the control system makes such effective use of heat energy that the plant's fuel bill has been greatly reduced. Feed rate is recorded on an *ElectroniK* potentiometer recorder. Water input is controlled by a pneumatic recorder with *Air-O-Line* pneumatic control. The temperature control system consists of a temperature transmitter, *Tel-O-Set* miniature pneumatic controller and diaphragm control valve.

pH control in sugar refining

Control of *p*H at various stages of the sugar refining process is important, and Electronic Instruments, Ltd., say that their equipment is used in several sugar refineries. Most modern sugar factories use the carbonatation process as the main method of purification. In this process, a measured quantity of lime is added to the raw juice and CO_2 gas is passed through the solution to precipitate the lime as chalk. The chalk acts as a filtering agent, removing the impurities from the raw juice. The amount of CO_2 fed to the carbonatator is automatically controlled by a *p*H meter so that the *p*H of the liquor is kept between 10·5 and 11·0. The carbonatation process is usually repeated, but the *p*H of the liquor is controlled at a lower value (8·5 to 9·5) by further addition of CO_2. In any determination of *p*H it is necessary for the electrodes to make contact with the fluid to be measured, and in the case of sugar liquor this can be done by using the dip electrode B28 which is mounted on the side of the carbonatator in a tank or jaw box. A sample line is fed from the carbonatator into the jaw box. The liquor then overflows from a weir into the compartment where the electrode is situated, and excess from this is diverted back to an earlier stage in the process.

Sulphitation usually follows carbonation, particularly if white sugar is being produced; this process also involves the automatic control of *p*H. It consists in passing SO_2 gas through the liquid until the neutral value of *p*H 7·0 is reached.

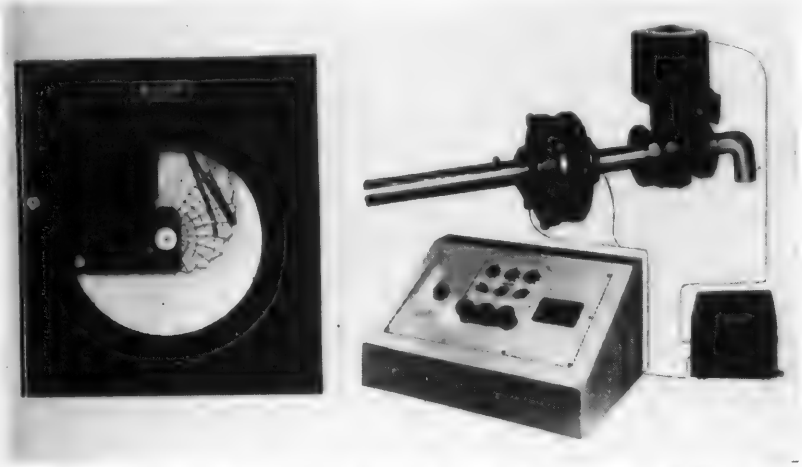
In the extraction of sugars from beet, the process water has to be maintained slightly acid, and its *p*H can be adjusted automatically within the range 5·5 to 6·0.

Flow control

Liquid flow measurement is especially important in brewing, baking and canning, and Measurement, Ltd., offer their "S" range of rotary piston meters, which can be made in stainless steel or other material, for edible oils, sugar syrups, etc. When fitted with a simple index, the meters can be used for continuous measurement, but much of their equipment is used for automatic process control, in which liquids are dispensed at the push of a button.

An electro-magnetic transmitter fitted to an "S" meter sends output signals to a control panel, on the front of which is fitted an automatic batch indicator, signal lamps, totalising counters, etc.

For measuring liquids to very small increments, the firm supply the *Unipulse* meter, which has few moving parts and no gearing. When dispensing, the meter transmits signals.



(*Left*): An "ElectroniK" control instrument made by Honeywell Controls, Ltd., showing cam for programming a process. (*Right*): A "Unipulse" flowmeter made by Measurement, Ltd., in a typical circuit with panel unit, where a preset batch quantity is set by rotary switches and shown on dekatron tubes, with the total quantity indicated on a magnetic counter.

Control of water temperature

A means of supplying process water at any desired constant temperature is provided by the *Leonard* thermostatic mixing valve made by Walker, Crosweller and Co., Ltd., who say that J. Lyons and Co., Ltd., have installed them on the tempering tanks and on the large doughnut-making machines in their new bakery at Chessington, Surrey, claimed to be the first fully-automated bakery in the country. The valve is designed to mix hot and cold water, or steam and water, so that a supply of warm water at a constant required temperature is always available. Temperature control is achieved by means of a bimetal coiled thermostat, and the makers say there are no mechanical or electrical parts to go wrong.

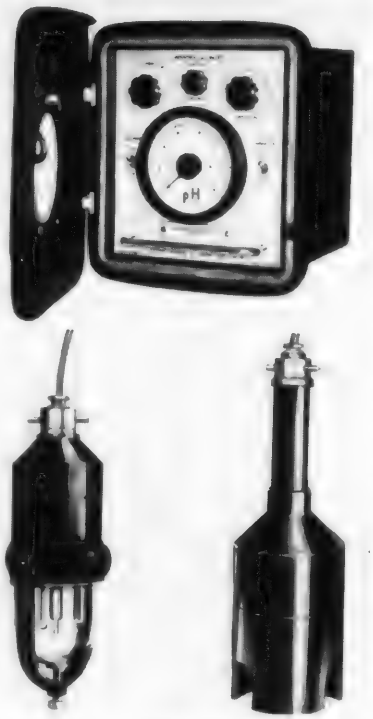
Suitable applications for this valve include control of water supplies to jacketed vessels, controlled tepid water supplies for vegetable rinsing, and especially in bakeries for controlling the water supply temperature for dough tempering tanks.

Other equipment made by the same company includes the *Arkon* series of gas and liquid meters and recorders.

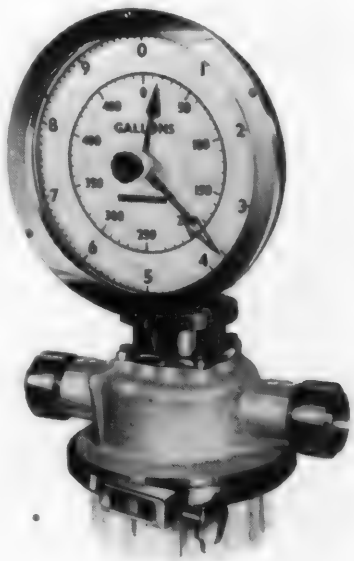
Pipeline heating

Controlled automatic heating of pipelines is of advantage in such processes as chocolate, confectionery and glucose manufacture. Electric heating tapes for this purpose are made by Isopad, Ltd. A sensitive bulb is placed between the surface of the pipe and the heating tape, and to presettable indicating devices which are set by rotary switch or dial. For continuous mixing, the "S" and *Unipulse* meters can indicate rate of flow remotely. The makers say that there is almost no limit to the type of electrical interlocking that can be arranged, and almost fully-automatic plant can be provided by using sequential switching, time relays, etc.

A hygienic displacement meter for flow rates from 500 to 3,000 g.p.h. is the model SM/LV9 made by Tylors of London, Ltd. This can be used either with a large dial for easy visual reading or with the firm's standard electric dials giving integral or remote readings with full automatic batch control. It has a quick-release clamp to facilitate easy dismantling for sterilisation, and all internal surfaces are machined and highly polished. It has standard A.P.V. type "SP" in-place couplings, and is designed for in-place cleaning at up to 140°F. with weak detergent solutions. Constructed of stainless steel or bronze, its accuracy is claimed to be 0·25% over the specified flow range; a capillary leads to the control head which can be set to any required temperature between 80 and 230°F., or between 150 and 550°F. Thermal lagging is usually placed over the tapes, enabling accurate and economic maintenance of flow temperature.



Instruments for measuring *p*H made by Electronic Instruments, Ltd. (*Top*): Model 28A industrial *p*H meter. (*Bottom, left*): Model A28 continuous flow electrode system for automatic *p*H control. (*Bottom, right*): Model B28 dip type electrode system.



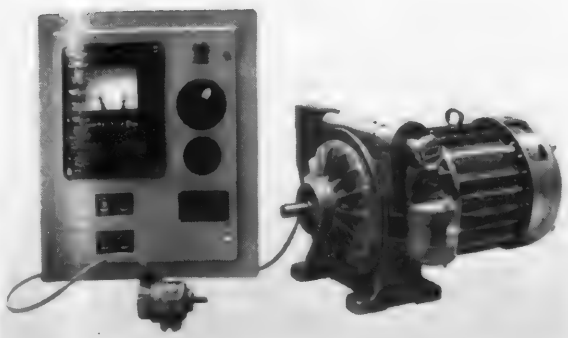
This 2 in. model "SM" Hygiene Meter for liquid food products, made by Tylors of London, Ltd., shown with large easy-read dial, can also be used with electric dials for automatic batch control.

PACKAGE MONITORING

The process of packaging may consume as much as half a factory's processing effort, and opportunities for automation in the packaging lines are numerous. Besides the actual wrapping and cartoning, such operations as batch counting, check-weighing and metal detection are obvious operations where automation can be applied.

Breakfast cereal packaging

High output and uniformity of breakfast cereal packs provide opportunities for automatic package monitoring which the major companies have fully exploited. Quaker Oats, Ltd., use a system devised by Photoelectronics, Ltd., which observes every packet and automatically ejects any that do not comply with specified standards or which are accidentally without liners. The equipment operates by projecting three light beams across the conveyor at the check point on to photo cells. The beams are so placed that the top beam is broken by the liner and the bottom two by the packet. A fourth light beam projects a light beam down on to the top of the packet, and the amount of light falling on to a photo cell varies



A speed corrector unit, for use with Kopp variable speed gears, which maintains constant linear or rotary speed when the driving speed is varying.

How automation helps the caterer. Temperature measuring probes in meat, working with automatic temperature controllers, enable more cooked meat to be obtained from a raw joint. (*Photo by courtesy of Honeywell Controls, Ltd.*)

A "Leonard" valve made by Walker, Crosweller and Co., Ltd., in use for controlling the temperature of the water supply to a dough mixing machine in a bakery.

with the angle of reflection; if the packet is under- or over-filled, the amount of light falling on the cell is reduced and by means of a relay the packet is ejected. All the cells operated by the four light beams are interconnected so that unless the package is perfect in every respect, the package is automatically ejected.

On the same line there was also the problem of keeping a number of empty cartons "bunched" prior to the filler; to replace the supervisors whose job it was to switch off should there be a gap in the supply of cartons, a relay type GTP/TD made by the same firm was fitted. This consists of a light beam projector and photo-transistor receiver with built-in time delay. With cartons "bunched" at this point the light beam is permanently broken, and when the absence of cartons causes the beam to be made, the filling unit is automatically switched off. When the cartons once more flow along the conveyor the beam is broken, but this does not start the line again until the preset time delay has expired to ensure that cartons are in position ready for filling.

The counting of the filled containers is performed by Photoelectronic equipment type TCU. The containers breaking the light beam energise an electro-mechanical counter which provides an accurate record of production.

Checking products

A metal detector made by the Automa Engineering Group is the *Loma* metal detector, which incorporates a stabilised power supply. The objects to be inspected are carried through a detector head on a conveyor belt. Several reject systems are possible; the belt may be stopped, the contaminated object may be pushed off the conveyor, or a marker may be dropped on it. The makers say it is especially suitable for such applications as hot bread and meat. A fully-transistorised model is available, in which the control unit is incorporated in the head, which is of split design to facilitate installation.

In some cases, inspection may be made during the manufacturing process, in others the pack may be inspected. For instance, in sausage production the detector head may be mounted on the nozzle of the filling machine or the whole sausage pack may be inspected after wrapping.

The *Elliott-Automa* made by the same firm will handle packs of various sizes and shapes, as well as cans, at 120 per minute, with full Board of Trade approval of 0·2% accuracy, say the makers. Their *Electroma* electronic batch counter can be integrated with a conveyor system which incorporates a rout-

ing system. The required batches are set up on the control unit. The equipment is suitable for counting bread rolls, and other objects, into baskets, for despatching orders.

Programmed actuators

The equipment made by the same firm under this heading is used for controlling machines and devices according to a predetermined pattern. It consists of an electronic counter and a number of pneumatic piston-type actuators. The movement of each actuator is initiated by the control unit which can be preset according to any command. The actuators can be used with various machines, and typical applications, say the makers, are converting manually controlled plant to automatic control, and special handling and packing operations.

MOTORS AND GEARS

Variable speed gears from 1/33 to 15 h.p. suitable for incorporation in automatic systems are the Kopp range made by Allspeeds, Ltd. All units have a stepless speed variation of 9 to 1 (1/3 to 3 times the input speed) and transmit constant power throughout their output speed range.

A new "package" type unit has been designed to adjust automatically a varying speed so as to obtain a final constant linear or rotary speed, as, for example, the winding of material on to a drum when material build-up would normally increase the linear speed. The unit is fully automatic and will operate over the full range of standard Kopp variable gears. The speed selected to suit the material or process is set on the dial control and maintained to within 1 to 5% depending on requirements.

Electrification contracts for automatic installations are carried out by Crompton Parkinson Ltd., who recently introduced a range of totally enclosed, fan cooled, industrial a.c. motors with Class E insulation, which are claimed to develop up to twice the power of previous standard totally enclosed machines of equivalent frame size.

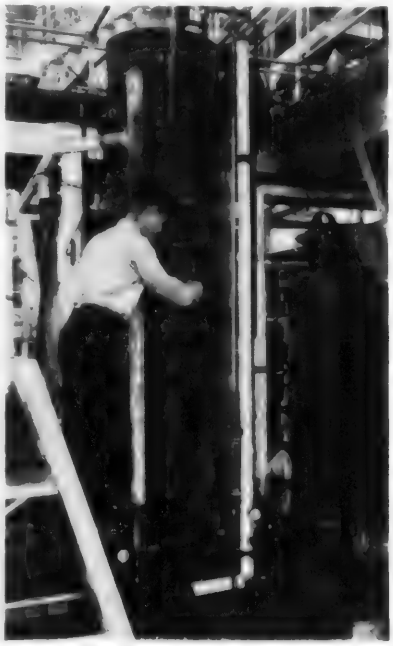
Rating for rating, these new motors, designated series 5 T.E.F.C., are substantially smaller and lighter, and on average 9½% lower in cost than the machines they replace. A noteworthy improvement is the new design of fan which gives much more effective cooling. The full range of motors cover ratings from 1 to 40 h.p. at 1,400 r.p.m.

Rice Value Raised by New Milling Technique

AN improved rice milling technique, developed by agricultural research workers of the U.S. Department of Agriculture, has been scaled up from pilot plant to commercial operation. Application of the new technique to existing rice milling equipment resulted in less breakage and therefore higher yields of the whole, undamaged grains known as head rice. It is estimated that the new technique can increase the value of milled rice products by as much as $2 million annually.

The investigations were carried out at the pilot rice mill of the Institute of Science and Technology, University of Arkansas, under a research contract with the U.S. Department of Agriculture and in co-operation with industrial mills. More than 150 samples of long and medium grain rice were milled to determine the amount of breakage that takes place in each step of the operation. The results showed that there is wide variation in the behaviour of individual lots of rice, that much rice is broken before milling begins, and that the greatest amount of breakage during milling, with few exceptions, takes place in the first and second hullers where the bran is removed from the rice kernel.

A study of the steaming of brown rice (rice with the bran intact) and the addition of different types of abrasives before the scouring operation showed that these pre-treatments did not materially affect the yield of whole rice. However, the research demonstrated that the efficiency of the scouring operation, and therefore the capacity of the milling plant, is increased by 20 to 30% when a combination of these pre-treatments is used. Steam and abrasives assist in the removal of the bran and thereby decrease the severity and amount of scouring required.



Part of the pilot plant at the University of Arkansas for the application of filtration-extraction to rice bran, showing the kettle-type cooker.

An investigation of the effect of temperature and relative humidity in the pilot-plant milling room on the yield of head rice showed that optimum yields of head rice were obtained when the milling-room atmosphere was maintained at a relative humidity of 70%. Lower or higher relative humidities resulted in markedly reduced yields. For example, yields of head rice increased 4 to 6% when the relative humidity was changed from 30 to 70% with no change in temperature.—M. LORANT.

Dehydration of Carrots

By E. G. B. Gooding,* M.A., M.I.Biol., C. G. Tucker, B.Sc., and D. B. MacDougall

Previous articles (see November, 1955, November, 1956, and September, 1957) by Mr. Gooding and his colleagues have described work carried out at Aberdeen to solve the many problems in connection with carrot dehydration. This article carries the work a stage further and brings together most of the existing knowledge of the subject, besides including much material which was not known when the previous articles were written.

IN 1951 when the Experimental Factory was opened, dehydrated carrot was produced in the form of strips or dice to a specification requiring the strips to have a cross section of $3/16 \times 5/16$ in., a moisture content not exceeding 7% and sulphur dioxide content lying between 500 and 1,000 p.p.m., for material to be used in the tropics. Higher moisture contents (max. 9%) and lower SO_2 contents (max. 300 p.p.m.) were permitted for material to be used in temperate climates.

To be prepared for eating, this product required the addition of hot water followed by two hours soaking and 20-30 minutes gentle boiling. It stored well under temperate conditions, material packed in nitrogen showing very little deterioration in two years at 18°C., but at 37°C. it became almost inedible after about three months.

Studies at Aberdeen in the past eight years have covered many aspects of the dehydration of carrots; while the main objective has been to prepare products of good appearance, flavour, and texture which can easily and quickly be prepared for eating, a considerable amount of work has been devoted to the reduction of losses during scalding, studies of the drying process, and prolongation of the storage life of the product. Most of the results have not yet been applied commercially though the reduction in moisture content of the product, which early studies of storage life showed to be essential for even moderate storage life in the tropics, was incorporated in new specifications in 1953.

The present paper attempts to give a brief summary of the experimental results obtained at Aberdeen; the work has been fully reported in the Ministry's internal records.

1 RAW MATERIAL

Only stump-rooted varieties are suitable. Since the flavour of dehydrated carrot is weaker than that of the original fresh material, strongly flavoured varieties have been sought, but so far no variety that can be regarded as consistently strong in flavour has been found. Varieties tried have included Red-cored Chantenay, Early Nantes, Favourite, James's Intermediate, Stump-rooted Intermediate, Clucas' New Model Red and St. Valery; the majority were grown in eastern Scotland.

Samples of Favourite and James's Intermediate have from time to time seemed to have a stronger "carroty" flavour than the generally used Red-cored Chantenay, but large-scale deliveries have always been disappointing. Further, variety Favourite, although predominantly red-cored, has included a proportion of most unsightly white or green cores, and the yellow cores of St. Valery have considerably detracted from the appearance of the product.

No consistent difference in dry matter content of different varieties has been found; Red-cored Chantenay grown at Elgin in Morayshire has varied from 9·5 to 12·4%, and all others examined have been within this range. At the present time, therefore, it seems that Red-cored Chantenay remains the most satisfactory variety for dehydration, but a systematic study of carrot varieties, especially new ones, is most desirable.

No attempt has been made to compare the β-carotene contents of different varieties of carrots, nor to ascertain whether there are any changes in this, or in flavour, during storage of mature carrots.

Opinion among carrot growers varies as to whether carrots should be stored after pulling or whether they should be left in the ground until the last possible moment. Recent work suggests that the latter is preferable (weather permitting) since there is a severe and rapid loss of dry weight of carrots stored even at relatively low temperatures (average approximately 40°F.) for periods as short as two weeks. (Also see below—"Scalding.")

2. PREPARATION

No systematic work has been carried out on the preparation of carrots for processing. Peeling has been by abrasive machines, and peeling losses have averaged 19·9%, ranging from 38·6% to 8·3%. Reducing the speed of one of these machines and modifying the gates to give a smaller opening reduced the average peeling loss to 16·4%. Trimming (by unskilled labour), including topping and tailing by hand, has given losses in the order of 8%, so that the total preparation losses are usually about 24-25% of the raw carrots entering the factory.

* Head of Process Development Section, The Experimental Factory, Ministry of Agriculture, Fisheries and Food, Aberdeen.

Steam peeling has not yet been tried, but examination of a commercially operating installation has indicated that by this technique it should be possible to reduce peeling losses to a level no higher than about 10%.

3. CUTTING

Several sizes of dice and strip have been cut (see below—"Size of piece"). If whole carrots are fed to a rotary dicer, of the Urschel or Mather and Platt type, set to cut slices, the majority of the slices will be longitudinal—an unpopular (perhaps because unfamiliar) form. If the carrots are cut transversely by the trimmers into pieces shorter than their diameter, the machine will produce a larger proportion of circular (transverse) slices.

A machine to cut circular slices from whole carrots is under development.

4. SIZE OF PIECE

Air dried slices of 3/16 in., 1/8 in., and 3/32 in. thickness, strips of 3/16 × 5/16 in., 1/8 × 5/16 in., and 3/32 × 5/16 in. cross section, and flakes of dimensions 1/8 × 5/16 × 3/8 in., 3/32 × 5/16 × 3/8 in., and 1/16 × 5/16 × 3/8 in. have been studied.[1,2] In general, the thinner the piece the greater was the leaching loss during water scalding,* the greater the rate of drying during the later stages of dehydration, and the lower the final moisture content; the latter feature gave the thinner material longer storage life at high temperatures.[2] Strips 1/8 in. and 3/32 in. thick could be cooked without prior soaking, as could the flakes.

The thin strips, however, were weaker in flavour than the thicker strips and were rather translucent in appearance.

It was possible to dry much thicker pieces by the accelerated freeze drying technique (slices up to ½ in. thick and small whole carrots) but the texture of the product was unsatisfactory.

* Losses during steam scalding appeared to be independent of strip thickness.

5. SCALDING

(a) Leaching losses

Small-scale and large-scale experiments have been carried out with a fairly high degree of precision and it has been shown that:

(i) Strips 3/16 × 5/16 in. in cross section may lose up to 30% of their dry matter when scalded for 3½ minutes in water.

(ii) When the solutes leached from the carrots have accumulated to a concentration of about 2·5% in the scald liquor, the leaching losses are reduced to about 15%, and, when the concentration has reached 4-5%, are in the order of 10-11%. Between scald liquor concentrations of 1% and 4% the yield of dehydrated strips rose by approximately 30%.[3]

(iii) The losses from strips 3/32 × 5/16 in. were substantially higher than for strips 3/16 × 5/16 in. throughout the whole range of solute concentrations,[3] and when scalded in liquor of 3-5% soluble solids concentration, the yield of the former was 10-15% less. There was, however, little difference in leaching losses between 3/8 in. cubes and strips 3/16 × 5/16 in. cross section.

(iv) Leaching during steam scalding averaged about 8% of the dry matter entering the processing line, and this was less than the leaching losses from material scalded in liquor containing 4·5-5·0% of soluble solids. Since a maximum of about 3% soluble solids is regarded as a compromise whereby reasonable storage life may be obtained without too excessive a loss of yield and flavour, the advantage of steam scalding is considerable.[3]

(v) Scalding in steam does not lead to greater losses with thin strips (3/32 in.) than with thick (3/16 in.).[3]

(vi) Wilting of carrots by a period of storage before dehydration leads to a reduction in leaching losses during steam scalding, and a higher recovery of dry matter from the carrots entering the processing line, but the loss of dry matter during storage before processing is so great that there is no gain, and even a net loss, in the weight of dehydrated product obtained from the original stock.

(b) Conditions of scalding and storage life

It had been thought for a long time that water scalded carrots would, by virtue of the greater leaching of their reactive solutes, have longer storage life under tropical conditions than steam scalded material. It has, however, been clearly demonstrated that, except for material scalded in liquor containing a very low concentration of soluble solids (less than 2%), water scalded dehydrated carrots have a shorter storage life at 37°C. than corresponding steam scalded material.[3] (Also see section 10 below "Storage Life.")

It appears that precursors of the browning reactions are formed when the leached out solutes are heated together in the scald liquor, and during scalding the carrot becomes impregnated with these substances, which subsequently lead to discoloration and bitter flavours when the dehydrated product is stored at elevated temperatures.[2]

(c) Use of phosphate in scalding

It has been a common practice for many years to add 0·1 to 0·2% sodium dihydrogen phosphate, together with 0·012 to 0·025% sodium carbonate, to carrot scald liquor to ensure that any soluble iron salts are precipitated, since it was established[1] that the presence of iron (1-10 p.p.m.) in the scald liquor could cause an unpleasant grey-brown or brown-black colour in certain strains of carrots. This practice has been continued for water-scalded material, and phosphate and carbonate have been added to sulphite sprays when steam scalding, without any critical re-examination of the problem.

6. SULPHITING

(a) During water scalding

In the continuous scalder employed at Aberdeen, satisfactory results were obtained for strips 3/16 × 5/16 in. with a liquor con-

Table 1

Stage I	...	...	30 min. at 230°F.	D.B.,	115-130°F.	W.B. (cross flow)
,, II	...	...	30 min. at 185 F.	,,	100-110°F.	,, ,, ,,
,, III	...	...	120 min. at 160 F.	,,	85-90°F.	,, ,, ,,
,, IV	...	...	180 min. at 145 F.	,,	80-85°F.	,, (through draught deep tray)

taining sodium sulphite to give a concentration of 250 p.p.m. sulphur dioxide, 0·1 to 0·2% sodium dihydrogen phosphate and sodium carbonate sufficient to maintain the liquor at a *p*H of about 6·5. The sulphur dioxide in the product lay between the required limits of 500 and 1,000 p.p.m. For strips 3/32 × 5/16 in. it was necessary to reduce the sulphur dioxide content of the liquor to about 200 p.p.m.

(b) During steam scalding

Solutions containing a mixture of 0·025% sodium dihydrogen phosphate and 0·003% sodium carbonate, and sodium sulphite at concentrations ranging between 0·15% and 0·35%, were sprayed on to the carrots at varying rates just before emergence from the steam scalder. It was found that:

(i) At any given rate of application of dosing solution (lb. spray per lb. vegetable) the sulphur dioxide content in the product increased with increasing concentration of sulphite in the dosing solution.

(ii) At any given rate of application of sulphite (weight of sodium sulphite per unit weight dry matter in the vegetable), increase in the volume of spray (*i.e.* increased dilution of solution) was accompanied by a reduction in the amount of sulphur dioxide retained by the vegetable.

(iii) In order, however, to obtain adequate coverage with the normal tray load passing through the steam scalder (approximately 1·4 lb. per square foot) a minimum dosing rate of about 0·5 lb. solution per lb. vegetable was required.

Low spray rates gave uneven dosing: at high spray rates the increased run-off resulted in final SO_2 concentrations which were lower than strict proportionality indicated.

(iv) The uptake of sulphite by strips was considerably higher than that by slices, and that by dice was higher than that by strips.

(v) Assuming 750 p.p.m. sulphur dioxide in the product to be the desirable level, the rates of application of sulphite, at a dosing rate of 0·5 lb. spray per lb. vegetable, were approximately:

Slices 1/8 in. thick: 14 lb. sodium sulphite per 1,000 lb. dry matter in vegetable.

Strips 1/8 × 5/16 in.: 9 lb. sodium sulphite per 1,000 lb. dry matter in vegetable.

7. DRYING

(a) Hot-air drying

Conditions of drying in the three stage cross flow dryer[5] were established which would bring strips 3/16 × 5/16 in. cross section to a moisture content of about 6·5% in 5 hours 10 minutes. Strips 3/32 × 5/16 in. came to about 4·5% in the same time.

With the addition of a "deep tray" fourth stage,[5] conditions were re-determined and the "standard" conditions are now as shown in table 1.

Other conditions being similar, the rate of drying and the final moisture content attainable in a given time are governed largely by the thinnest dimension of the piece of vegetable. For example, in the three stage dryers, in 5 hours 10 minutes, the following average final moisture contents were obtained.

Table 2

Strips	... × ... in.	...	...	6·0%
,,	... × ... in.	...	...	4·5%
Dice	... × ... × ¾ in.	...	...	6·1%
,,	... × ... × ½ in.	...	...	5·4%
,,	... × ... × ¼ in.	...	...	4·2%
Slices ⅛ in.	...	...	...	6·1%

In the present four-stage drying system with 6 hours drying, average moisture contents for dice 1/16 × 5/16 × 3/8 in. have been 3·6% and for slices 1/8 in. thick, 5·0%.

It was found that slices could be dried on trays without any reduction in tray load: as the slices lost water in the earlier stages of drying they curled up at the edges and the blanketing effect of the upper layers over the lower layers, that has often been put forward as a reason why slices could not be dried successfully, did not occur.

Although the conditions outlined above are still used as "standard," recent work has been re-examining the necessity for using high initial temperatures and several drying stages.[5, 6] It was found that using initial temperatures ranging from 250°F. to 160°F. and with factory scale equipment and tray loads, although the rate of drying in the early stages was closely related to the dry bulb temperature of the air-stream, after about four hours the drying curves coincided, *i.e.* the moisture content of the material had reached the same level in spite of the differences in the initial temperatures and rates of drying. Subsequently there was no difference in the drying rates and the final products were of similar moisture content. The explanation seemed to lie in the fact that when a vegetable is spread on trays at loadings that would be commercially feasible (in this case about 1½ lb. per sq. ft.), drying in the early stages is far from uniform and a substantial proportion of the load is unable to benefit from the more rapid drying brought about by high initial temperatures: it still requires a considerable time for the whole mass of the vegetable to approach uniformity in moisture content, and this is happening in the intermediate period of drying.

In the final period the rate of drying is mainly controlled by the rate at which water can migrate from the centre of the piece of carrot to the surface, and this is a slow process, and apparently unaffected by the temperatures used in the early stages.

The effect of drying conditions on the quality of the product is not yet clear: browning can be brought about by too high temperatures in the intermediate and final stages and conditions to avoid this have been established, but

there is a possibility (see section 10 below) that flavour may be affected before visible browning appears, and further work is necessary to establish the drying conditions to yield a product with the best possible flavour.

(b) Accelerated freeze drying[1]

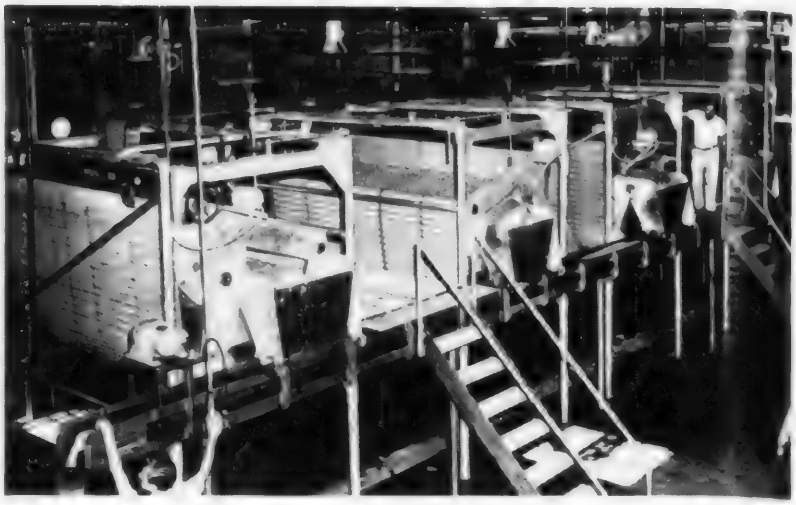
On the small scale, in a pilot vacuum contact-plate cabinet with a tray area of 2 square feet, dice 5/16×5/16×3/8 in. have been successfully dried. There was little or no shrinkage of the material during drying, and reconstitution in boiling water required only 1 to 2 minutes. If the dice were cooked in steam for 10 minutes before dehydration, no further cooking was necessary on reconstitution and the total time required for preparation of the product for eating was 1 to 2 minutes.

On the large scale (trays of 32 sq. ft. area), it has not yet been possible to produce a uniformly freeze dried product; a proportion of the dice has always shown some degree of thawing. Even so, the product reconstitutes fully in 15 minutes simmering, and in spite of the fact that some dice are not fully reconstituted after 5 minutes cooking, this material appears very attractive when included in "5 minute soup mixes." Further development work is, however, still required if a really satisfactory product is to be obtained, and before a reasonable estimate can be made of the cost of the process.

Attempts to dry thicker slices of carrot (1/4 to 3/8 in.) and small whole carrots have not been satisfactory. Dehydration to low moisture contents has been achieved, but it has seldom been possible to achieve accelerated freeze drying without partial thawing, and those pieces which have been properly freeze dried have had a spongy and rather unpleasant texture.

8. COMPRESSION

Air dried carrot strips or slices are among the easiest vegetables to compress, and blocks with a density of about 1 g. per ml. can be manufactured by subjecting the vegetable, heated to a temperature of about 160°F., to a pressure of 2,000 lb. per sq. in., in moulds heated to about 120°F.



A belt-trough dehydrator developed by the Agricultural Research Service of the U.S. Department of Agriculture of Albany, California, has been adopted by several firms in the U.S.A. for conventional vegetable drying and is being tried out commercially for dehydrating fruit. It consists mainly of a broad, endless, moving wire-mesh belt that forms a trough; fresh produce is fed it at one end and heated air is blown upwards from underneath. The picture shows four such dehydrators in a commercial plant.

(By courtesy of U.S. Department of Agriculture.)

Circular blocks containing 8 oz. dehydrated carrot measure $5\frac{7}{8}$ in. diameter and 5/16 in. thick, immediately after pressing, relaxing to 7/16 in. thick in a short time. Six such blocks can be packed into a "3 lb. flat" can (6-3/16 in. diameter by $3\frac{1}{4}$ in. high overall).

Air dried dice can be compressed with equal readiness, but the blocks are less coherent.

Debulking—*i.e.* partial compression direct into the can—is readily accomplished by heating the air dried vegetable to about 160°F., and forcing direct into a cylindrical can by a plunger under pressure of 3 to 5 lb. per sq. in. An "A-10 tall" can (6-3/16 in. diameter by $9\frac{1}{4}$ in. high) packed in this way holds 4 lb. of the product, compared with $2\frac{1}{2}$ lb. for strips 3/16×5/16 in. or $1\frac{1}{2}$ lb. for slices 1/8 in. thick as normally packed.

Dice which have been dried by accelerated freeze drying shatter badly when compressed; no experiments have so far been carried out on debulking this product.

9. STORAGE LIFE

Commercially produced water scalded dehydrated carrot strips 3/16×5/16 in., manufactured to the specifications current in 1950, *i.e.* moisture content 7% and 1,000 p.p.m. sulphur dioxide, were found to have a storage life of over two years at 18°C., but no more than three months at 37°C.

Improved drying techniques have permitted the specification limit for moisture level in air dried carrots to be lowered to 5%, and material to this specification shows a marked increase in storage life at 37°C.; the use of an in-package desiccant has given further and very substantial improvement. Carrots dried by the accelerated freeze drying technique are of low moisture content (2-3%) and consequently are expected to have long storage life under tropical conditions.

The conditions of scalding have a profound effect on the high-temperature storage life of dehydrated carrots, and water-scalded material is more liable to browning than soluble solids content of the scald steam-scalded material, unless the

liquor is very low (see "Scalding," above).

No substitute has yet been found for packing in nitrogen if oxidation is to be avoided, except that when at least 2½ lb. of dehydrated carrot are packed (by compression) in a "3 lb. flat" can (6-3/16 in. diameter by 3¾ in. high) the proportion of oxygen remaining in the can is insufficient to produce detectable deterioration in the cooked product: it was calculated that the limiting oxygen content was on the order of 0·14 mg. oxygen per gram of dehydrated carrot.

The highly porous nature of carrot dried by the accelerated freeze drying process makes it more quickly susceptible to oxidation than the air dried product.

10. FLAVOUR OF PRODUCT

Dehydrated carrot is normally weak in "carroty" flavour, and unnaturally sweet. In air dried material the sweetness is often described as "jammy" or caramelised. Experimental results suggest that in strips or dice of the usual dimensions (3/16×5/16 in. or 3/16×5/16×3/8 in.) the main loss in flavour occurs during the first hour of hot air drying under the "standard" conditions at Aberdeen (see above), and that the caramelised flavour is also developed at that stage. The presence of sulphite definitely minimises the development of the caramelised flavour. Even with drying conditions which will cause the minimum alteration in flavour, strips or dice of relatively small dimensions lose a substantial amount of flavour to the cooking liquor; freeze dried material of this type is weak in flavour (though much superior to air dried), but freeze dried slices of ¼ in. thickness are strongly flavoured.

11. SPEED OF RECONSTITUTION

Conventional air dried carrot strips 3/16×5/16 in. cross section require the addition of hot water, soaking for two hours, followed by boiling for 20-30 minutes, to prepare them for eating. Dice 3/16×5/16×3/8 in. or 5/16×5/16×3/8 in. require similar treatment. Cutting strips more thinly, *e.g.* 1/8 in. or 3/32 in. elminated the need for soaking before cooking, but the flavour was weaker and the appearance, especially of the thinnest strips, pale and translucent.

Carrot flakes of 1/16×5/16×3/8 in., 3/32×5/16×3/8 in., and 1/8×5/16×3/8 in. cooked for 7-10 minutes in steam before dehydration, were of better appearance than the thin strips, and could be reconstituted by gentle boiling for 5, 8 and 12 minutes respectively.[1] The thinner pieces (1/16 and 3/32 in. thick) could be prepared for eating simply by the addition of boiling water followed by 5 minutes soak, and were of satisfactory texture though not fully reconstituted.

Dice of 3/16×5/16×3/8 in. or 5/16×5/16×3/8 in., cooked in steam for 10 minutes and subsequently freeze dried, could be reconstituted by soaking in hot water for 1-2 minutes, though in practice on the large scale it has not so far been possible to produce uniformly freeze dried material, and the present "accelerated freeze dried" product requires about 15 minutes gentle boiling.

12. UNSOLVED PROBLEMS

The ideal dehydrated food is one which closely resembles the original, as normally cooked and served, in every respect; in addition it should be easy, indeed foolproof, to prepare for the table, it should have a high packing density, a long storage life and should be economical to produce.

Some of the carrot products mentioned above possess some of these characteristics, some possess others; none possesses them all; there is room for a great deal of improvement. The following paragraphs indicate problems still requiring investigation.

(a) Raw material

New varieties of carrot are appearing each year, and it is possible that some of these may combine the characteristics which are desirable for mechanical processing and dehydration — namely stump rooted form, uniform taper or cylindrical shape, medium to large size, freedom from woodiness, strong carroty flavour and reasonably high dry matter content.

Cultural conditions may be as important as varietal differences, and information on such effects would have to be sought in collaboration with vegetable research stations.

(b) Preparation

Steam peeling should be studied, with especial reference to the economics of the process and its effect on the cost of the dehydrated product.

(c) Scalding

There is a potential use for a water scalder which will have a much smaller water capacity relative to throughput than most existing patterns.

(d) Use of phosphate in scalding

A critical re-examination of the value of the practice with stainless steel water scalders and with steam scalding is required.

(e) Flavour of dehydrated carrot

Even when it has been dried by the accelerated freeze drying process, dehydrated carrot is relatively weak in carrot flavour. At present the only hope for improvement in this direction seems to be in the use of raw material of strong initial flavour.

Air drying has been shown to cause loss of carrot flavour in the early stages and also to lead to some development of a caramelised flavour. Systematic experiments on the effect of different conditions of drying on flavour should give some indication as to how these deleterious changes can be avoided.

(f) Accelerated freeze drying

The non-uniformity of the product of the accelerated freeze drying process presents a problem that is still unsolved. Those dice

that are truly freeze dried are excellent, and it would be worth a considerable amount of effort if conditions could be found which would produce consistently good results.

Non-uniformity in drying and a spongy texture are characteristic of larger pieces of accelerated freeze dried carrot; modifications of drying procedure may improve the former, but the latter appears, at present, to be an almost insoluble problem, though fundamental investigations of the reconstitution process may give some indication of the direction in which a solution will lie.

(g) Compression of freeze dried carrots

A systematic study of compression and debulking of these products is required—the latter appears to have more chance of success.

(h) Storage life

The low moisture contents attainable by accelerated free drying should give carrots a long storage life under tropical conditions.

Oxidation remains the greatest enemy of dehydrated carrots which have been packed in air. Much fundamental work on protection of β-carotene is necessary before resistence to oxidation can be incorporated in the dehydrated product.

(i) Economics of the freeze drying process

It seems certain that, at any rate for some time to come, the accelerated freeze drying technique will be more costly than air drying. There is, however, no precise knowledge of the cost of the process.

There are indications that new developments will considerably increase the throughput of the plant for certain animal products; the possibilities of using comparable techniques for vegetables have yet to be investigated.

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BOOK REVIEW: How to identify Bacteria

THIS book* is divided into four main parts, a comprehensive key to the genera of bacteria, a digest of genera, methods, and a guide to study. The key is essentially the same as Bergey's and has been compiled with general directives for the identification of bacteria together with a complete test of the techniques needed. The digest follows the usual pattern of describing differential characters, type species and any brief notes which may be necessary. The guide to study gives groupings of bacterial genera for the purpose of helping the worker to select the appropriate methods which could save time and trouble.

Obviously with such a difficult and mutating subject as bacteriological taxonomy this book represents perhaps at best a courageous attempt to help the ordinary microbiologist. It is almost certain to call down the wrath of some of the pundits who wage a never-ending war for accuracy in a never-ending subject. This immediately raises the point, for whom is the book intended? The author mentions research workers, teachers and students, but since the book links methods with a guide to study this might be rash because every university appears to consider its own guide to study and methods as the best. But many microbiologists working outside university in many diverse fields may often or rarely be confronted with an organism which does not fit into their normal range. Many such organisms languish in cultures at the back of the bench because there is no link between them and Bergey's *Manual of Determinative Bacteriology*. For such workers this book should prove very useful and may tempt workers (possibly those outside the range contemplated by the author) to make essays into the taxonomic field which formerly they might have found too intimidating.

The book is of handy size with very clear print. The quality of the paper does not appear to be first class and this together with a cheap unboarded cover rather mitigates against its practical usefulness as a well thumbed reference book. These are minor criticisms which could later easily be met. There are 31 illustrations which, like all other microbiological pictures in black and white, pictorially vary from good to meaningless (cf. 9, No. 2 *Neuskia ramosa* and 19, No. 4, *Ramibacterium*). The index is good and there is no literary padding. The author states that it is intended as a supplement to Bergey's *Manual* and it is hoped that its use will contribute materially to the development of future editions of the *Manual*.—A. H. WALTERS.

* *A Guide to the Identification of the Genera of Bacteria* By V. D. B. Skerman. Pp. 257. Williams and Wilkins (Baltimore). Baillière, Tindall and Cox, Ltd., London. Price 44s. net.

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How Instant Mashed Potato Flake is made in Canada

COSTING more than $1 million, a new plant for the production of instant mashed potato flakes has recently been opened at Alliston, Ontario, by Salada-Shirriff-Horsey, Ltd. It is Canada's first and only plant of this type and has been completely constructed and placed in operation in a little more than seven months.

Having a floor area of about 65,000 sq. ft., the plant, built of brick, cement block and aluminium cladding, comprises a storage divided into three areas, a processing and packaging area and an office block. Built on a 240 acre site, the plant is adjacent to the main C.P.R. railway line to and from Western Canada.

A "high solids" type of potato is required for processing by this method, and these are brought in from the surrounding countryside in loads of up to 12 tons or in wooden tote boxes each holding about 1 ton. These are weighed and graded by a government inspector who establishes the solids content and other details upon which payment for the potatoes is based.

Following inspection, the potatoes are moved into one of two storage areas, either for immediate processing or for processing later in the season. In these areas, the potatoes are kept under suitable conditions in order to retain their desired quality, and from them the potatoes are moved into a conditioning room to be brought to the ideal state of temperature and humidity for processing.

In their processing, the potatoes are washed, steam-peeled, trimmed, sliced to approximately $\frac{1}{2}$ in. in thickness and then pre-cooked for 20 minutes in water at 160°F. They are then cooked in atmospheric steam until they are soft enough to rice. This usually takes 20 minutes for high solids types and about 40 minutes for lower solids varieties. Overcooking is harmful to their texture.

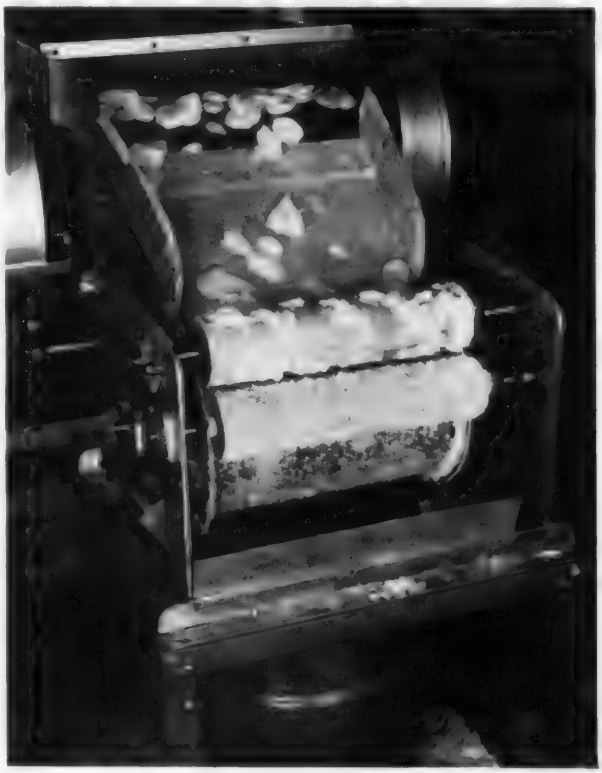
In developing the process, the researchers tried various methods of mashing the potatoes. Finally, a ricer was designed which consisted of a rotating perforated cylinder with 17/64 in. diameter holes, on the outer surface of which two small solid rolls were driven at the same peripheral speed as the drum. The clearance between the first roll and the drum is just sufficient to permit acceptance of the cooked slices of potato and to crush them slightly. The second roll is set close enough to force the potatoes through the perforations. A ribbon screw inside the perforated cylinder and rotating in the opposite direction discharges the product at one end. Additives are used, before the 99·6% pure potatoes are dried, to improve their flavour, stability and texture.

Drying of the mashed potatoes takes place on a single drum dryer, which is one of the largest in Canada, being 16 ft. long, 5 ft. in diameter and weighing 54,000 lb. This dryer can process 8,000 lb. of mashed potatoes into flakes every hour. The mash is fed to the top surface of the drum by a two-way ribbon screw rotating in the opposite direction from the drum. Small diameter unheated rolls progressively apply fresh mash to that already partially dried, thus building up a dense sheet.

A doctor blade removes the dried sheet, although in most cases, when a good dense sheet is being made, it peels away from the drum just ahead of the knife, leaving the surface quite clean. The sheet is made into thin $\frac{1}{2}$ in. flakes by a slitting roll followed by a roll which cuts the strips transversely. Thus the yield on drying is substantially 100% of the solids in the mash. The flakes are then packed in air tight packages either for consumer or institutional use under the *Shirriff* brand name.

To prepare the products for use at home, the flakes are added to a small quantity of milk and hot water. Butter and salt may be added to taste.

It is claimed that the Salada-Shirriff-Horsey flake process retains the natural characteristics of the potatoes to a greater degree than any other method, thus also ensuring a uniform fluffy product, save peeling and mashing time and eliminate waste.—J. GRINDROD.



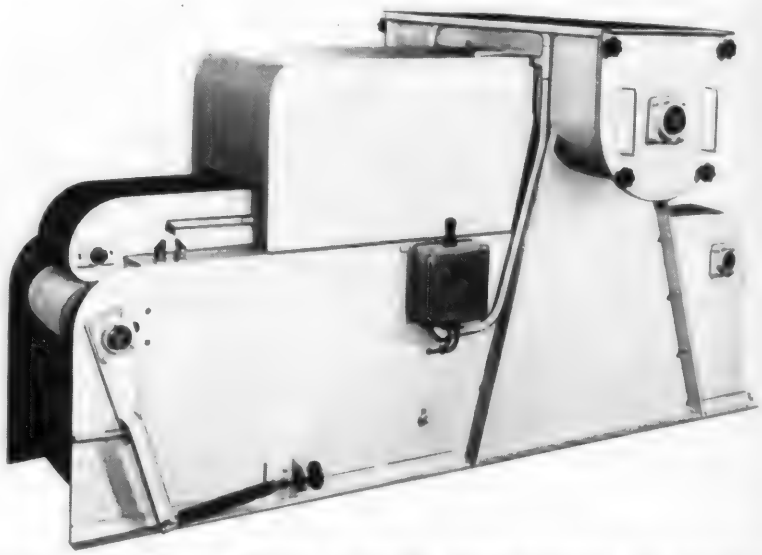
A potato ricing machine of the kind installed in the Alliston plant. Potato slices fall on to a rotating perforated drum, on to which they are pressed by two rollers revolving at the same speed as the drum.

Machinery and Equipment

FEEDER FOR DIFFICULT MATERIALS

A new machine made by Wm. Gardner and Sons (Gloucester), Ltd., is designed to store, weigh and feed at a predetermined rate materials which are normally difficult to handle, such as wood shavings, soft brown sugar and damp granulated products. It is based on a bunker which is fitted with an internal slow-running agitator keeping the material within the bunker "live." A small volume of the material is delivered through an opening in the bunker's side and the same total volume is always present within a container at the side of the bunker.

The feed mechanism is a belt which draws a layer of the material forward. It delivers a regular weighed quantity of material per minute by means of a controlling device which adjusts the thickness of material on the belt. This device is automatically compensated to allow for variations in density of the material in the bunker. With many materials an accuracy better than 1% is claimed.



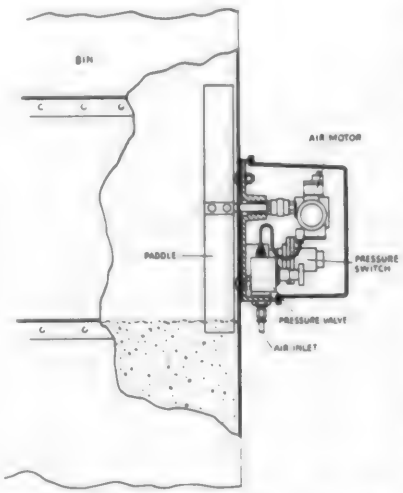
A stirred-bunker and belt feeder unit for handling difficult materials, newly introduced by Wm. Gardner and Sons (Gloucester), Ltd.

STACKING POLYTHENE BOXES

White, Child and Beney, Ltd., have produced a new range of heavy moulded polythene boxes, available in a variety of sizes, designed to stack up securely when full or empty. The boxes have a strong moulded rim which, it is claimed, facilitates handling and prevents bowing when full, and the base is moulded with additional thickness to give wear under heavy working conditions or on roller conveyors. The range is being extended, and at present includes bins, trays, boxes, tubs and tanks, ranging from 6 to 300 gallon capacity.

BIN LEVEL CONTROLLER

A new type of bin level controller, to regulate and indicate the level of materials in bulk storage containers, has been developed by Henry Simon, Ltd. Known as the *Bindex* pneumatic bin-level controller, it is operated by compressed air, can be used with most types of solids or liquids, and is claimed to be inexpensive, and simple to instal and maintain. It consists of a casing about 9 in. square housing a pressure valve, pressure switch and air motor. Outside the casing is a simple paddle (normally 16 in. long) connected to the air motor by a spindle which passes through the bin wall or roof, the casing being outside the bin and the paddle inside. The paddle oscillates under air pressure with a continuous see-saw motion, which is hampered or stopped when the level of the bin contents reaches the instrument. Interference with the movement of the paddle activates the pressure switch which operates a light, an alarm or a controlling device. The pressure valve can be finely adjusted to give instant reaction even on a material which offers little resistance to the paddle movement.



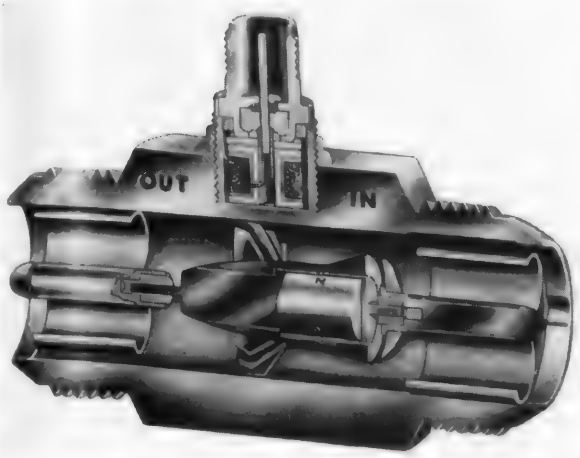
A drawing of the "Bindex" bin level controller made by Henry Simon, Ltd.

A 1½ in diameter hole is required to take the spindle, and the minimum air supply is 15 p.s.i.g. The approximate air consumption of a single instrument is 0·19 c.f.m. of free air and it normally operates at 8 p.s.i.g.

NEW PORTABLE MIXER

The Pioneer mixer, recently introduced by Premier Colloid Mills, Ltd., is a completely portable unit capable of mixing very small batches from 25 gallons to batches as large as 1,000 gallons Although the mixer can be supplied on a mobile stand, it is also suitable for clamp mounting, which gives universal movement so that the mixer head can be correctly positioned in the mix.

This machine has been designed for use at either high, medium or low speeds. Totally enclosed and flame proof, there are various motors available both for single and three phase, from ½ h.p. to 1 h.p. ranging from 400 to 3,000 r.p.m. The built-in reduction gearbox for the slow speed unit is integral with the motor casing and is so small that it makes little difference to the weight or overall dimensions as compared with the directly driven unit. Motor and mixer shaft are co-axial. Non-metallic gears are fitted, obviating the need for an oil bath. This mixer can be supplied with a patented *Dispersator* or stainless steel marine-type propellers to match the particular speed



A cut-away drawing of a Pottermeter flowmeter, made by de Havilland Propellers, Ltd., showing the magnet in the rotor and the coil mounted outside the housing.

and horsepower of the unit recommended. Shafts in 18/8 stainless steel come in various lengths according to requirements and can be rapidly changed from one length to another.

FLOWMETER

Under licence from the Potter Aeronautical Corporation of U.S.A., De Havilland Propellers, Ltd., are developing and producing a new type of flowmeter to be known as the *Pottermeter*. It is a turbine-type electronic meter with a rotor freely flowing in the liquid stream, and is made in sizes ranging from ½ in. to 22 in. diameter, covering a flow range of 0·1 to 40,000 gal. per min. Larger sizes can be made to order. No larger than the pipeline in which it is installed, it can be supplied with indicating, recording and/or control equipment, and gives digital presentation of results. It has only one moving part and no thrust bearings. For all practical purposes operating temperatures and pressures are unlimited. Standard material of construction is stainless steel, but it can be supplied in any non-magnetic material to order. Accuracy is claimed to be within ±0·5% or better over a range up to 20:1.

Mounted within the body of the rotor is a small permanent magnet, polarised at right angles to the axis of rotation, and as the rotor spins, this magnet sets up an alternating current in a coil of wire held within its field. The total number of pulses generated by the sensing element is directly proportional to the total quantity of liquid passing through it. The frequency of the alternating current produced is directly proportional to the rate of flow of the liquid through the sensing element. It is used in conjunction with an electronic totaliser.

LABEL GUMMING MACHINE

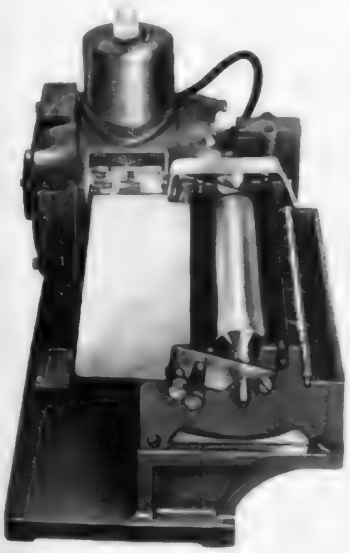
Recently redesigned, the *Beatall* range of label gumming machines made by Farrow and Jackson, Ltd., are supplied in five sizes, with roller widths from 6 to 14 in. They will handle any size or shape of label within their compass. Each model is supplied with an enclosed drip-proof ½ h.p. geared motor and top-mounted switch, the whole assembly together with gum box, feed and delivery units being mounted on a solid one-piece base, the only addition necessary for immediate operation being a suitable length of flex and a 3-pin 5 amp plug.

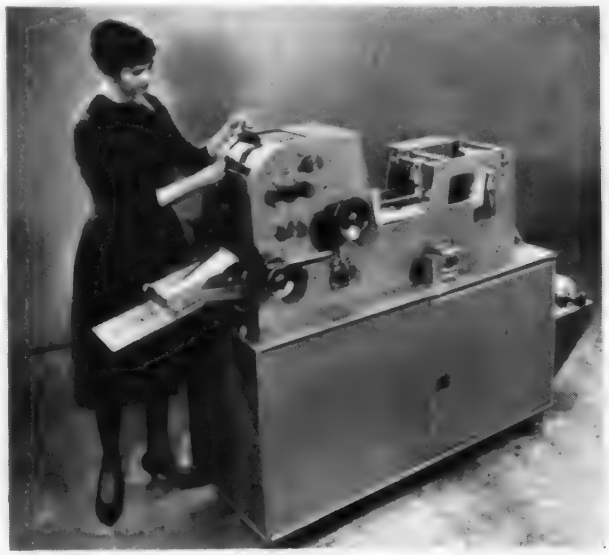
DUST CONTROL

The *Unimaster* 250 dust control unit has now been added to the 70, 100 and 150 by the makers, Dallow Lambert. This larger capacity collector with 250 sq. ft. of filter cloth area is designed for dealing with heavier dust concentrations. It is suitable for heavy duty individual machines, or, say the makers, can be used as a small multiple connection plant, having low initial and running costs in comparison with equipment that is specially designed. Runs of ducting can be attached, and alternative fans and motors, filters and dust containers can be supplied from a standard range.

LABEL OVERPRINTER

A new machine for adding changeable detail to printed labels has been produced by Tickopres, Ltd. This electric rotary machine, known as the *TICKOmajor*, incorporates slitting-cutters which slit the printed web lengthwise, thus allowing a number of labels to be printed simultaneously. The number of slitters used can be varied, enabling labels of any width up to 12 in. to be produced, and the detail on each of the labels being printed alongside does not necessarily have to be the same. The machine is also designed to produce the very narrow labels which are sometimes used in bottling and canning departments. A guillotine,





(*Left*): The "Beatall" electric label gumming machine made by Farrow and Jackson, Ltd. (*Right*): The operator of this "TICKO-major" label over-printing machine is checking the register of labels.

with a traverse of 6 in. automatically cuts off the printed labels.

Output varies according to the size of the label, but the manufacturers say that the machine can produce 150 impressions per minute. All operations, apart from threading the reel of paper and making adjustments, are fully motorised, and a predetermined-counter automatically switches off when the required number of labels has been printed. The makers state that although the machine is powered by three 250 v. A.C., single-phase motors, electrical consumption is low.

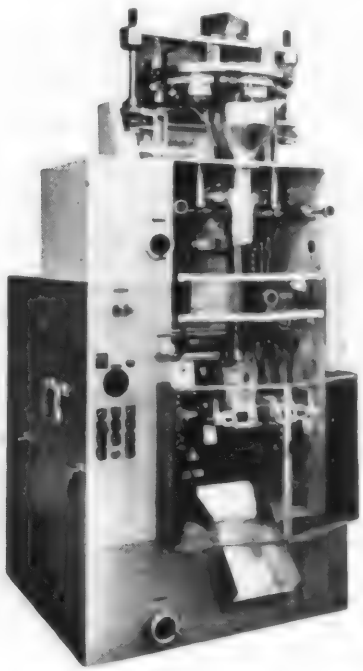
BULK FLOUR TRANSPORTER

James Nutter (Fulborn), Ltd. have recently put into service a new type of bulk flour transporter having a capacity of 10 tons, which will readily discharge both white and wholemeal flour. Designed and manufactured by Blaw Knox, Ltd., the unit is mounted on a B.M.C. 5·1 litre diesel-driven articulated vehicle supplied by King and Harper, Ltd.

The transporter comprises a container with an airslide in its base which delivers the flour through a rotary blowing valve and flexible pipeline to storage. Delivery rates are up to 12 tons per hour. A special feature of design in this new transporter is its ability to tip, which enables the airslide to be angled to achieve ready discharge of either white or wholemeal flour.

The steel container is stiffened externally to give smooth interior surfaces free from bolt heads and other obstructions. The steeply sloping walls of the container are epoxy resin painted for maximum hygiene and assure free flow of flour to the single 24 in. wide airslide which is located in the base of, and runs the full length of the container.

A Blaw Knox bulk flour transporter, of 10 tons capacity, delivering to Macfarlane Lang's biscuit works at Osterley.



A new packaging machine for free-flowing materials is this S-750 supplied by Baker Perkins, Ltd.

SAUSAGE FILLER AND LINKER

The Alpina sausage filling and linking machine ADF-80-860, is adaptable for use either for linked sausage production or for extruding measured portions, or it can be used for ordinary filling-out. It is operated by an oil-hydraulic circuit, and is constructed mainly in stainless chromium steel. It is designed for easy adjustment to suit individual needs, and the makers claim that weight adjustments can be rapidly and reliably carried out by means of a special air pressure releasing system. The machine is distributed in this country by Albrin Products, Ltd.

TEMPERATURE CONTROLLER

A new fully transistorised printed circuit amplifier-relay for use as a stable, sensitive temperature controller has been produced by Honeywell Controls, Ltd. Known as the *Versa-Tran*, it can be used for control in the range of −60 to +500°F. with a differential of 1·5°F. or 0·3°F. according to the model. Control is claimed to be very stable and errors due to ambient temperature easily compensated for by means of a calibration dial. The makers say that the wiring between sensing element and relay, which may be up to 300 ft. long, need not be shielded, ordinary 18 s.w.g. two-conductor insulated cable sufficing. Controllers are available for surface mounting, flush mounting or mounting in most electrical enclosures.

SUCTION CLEANING EQUIPMENT

New Welbeck, Ltd., have recently added a new model, the Simplex Floormaster, to their range of suction cleaning equipment. This is a powerful, light, mobile industrial cleaner mounted on a detachable trolley fitted with rubber tyred ball-bearing wheels. The power unit has special two-stage spring suspension which, the makers say, results in almost noiseless operation, and can be detached and interchanged with all other models in the range for spraying and blowing operations. A wide range of accessories enables this model to be used for all overhead cleaning.

PACKAGING MACHINE

The S-750 is a new machine built by the Package Machinery Co., of U.S.A., associates of Baker Perkins. It is, in effect, a complete packaging plant, and one unit carries out the following operations: forms packages from wrapping material, measures the product to be packed, fills and seals the package, cuts it off and delivers it down a discharge chute. It is suitable for all free-flowing products, including frozen vegetables and confectionery, and has a wide size range, forming bags from 3 to 15 in. long and 2 to 8¼ in. wide at up to 75 a minute. It has a single production head and the centralised electric controls are fully protected in a dust- and water-proof panel. The draw-bar is of the new linear crank-operated type, while the paper feed unit incorporates a pre-feed roll arrangement eliminating draw-bar pull and film stretching.

One basic type of package is possible on this machine, the pillow-type pack. This is formed from a single reel of wrapping material, and the result is a package with crimped and heat-sealed ends, and a heat-sealed longitudinal

This exploded picture shows the only four constituent parts of the Spirax ½ in. "TD" thermodynamic steam trap—top cap, moving disc, body and strainer.

seam running down the centre of one side.

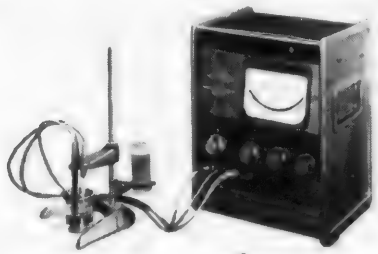
The normal wrapping material is 0·0015 in. medium density polythene, the actual gauge depending on the product being packaged. Heat-sealing cellulose film can be handled by changing the crimping jaws to the conventional resistance heating type instead of the impulse type employed on polythene. Unit assembly of size parts reduces bag size changeover time to less than 15 minutes. Change of packet length involves only adjustment of draw-bar mechanism and no interchangeable parts.

STEAM TRAPS

A new addition to the range of thermodynamic steam traps made by Spirax-Sarco, Ltd., is the ¾ in. screwed version, while the ¾ and ½ in. sizes have been revised and there are now two sizes available with flanged connections. The makers say that these traps work in any position, require no adjustment or change of valve size from 8 to 350 p.s.i., contain only one moving part (a hardened stainless-steel disc), and withstand superheat, waterhammer, freezing, corrosive condensate and vibration. Screwed models are made in stainless steel and flanged models in forged steel with stainless-steel inserts, and with the exception of the ¾ in. size, all have an inbuilt stainless-steel strainer.

LABORATORY *p*H METER

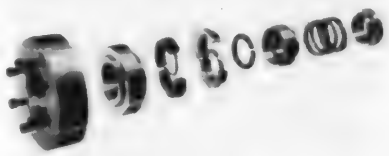
The new Marconi laboratory *p*H meter type TF 1003 is a mains-operated high-stability meter for use with a glass electrode system to give a direct reading of *p*H from 0 to 14. Any section of the scale can be expanded over a centre-zero incremental range of ±1·4 *p*H, enabling small changes to be measured with a discrimination better than 0·01 *p*H. The instrument also measures voltages in the range 0 to 1,400 mV and ±140 mV with the same high input impedance and stability as for *p*H measurement. A compartment in the rear of the instrument provides secure stowage for the temperature compensator, and for the stand, electrodes and buffer solution tablets available as accessories.



The Marconi laboratory *p*H meter type TF 1903, a combined direct-reading *p*H meter and high impedance d.c. millivoltmeter.

SPLIT MECHANICAL SEAL

A split mechanical seal which is claimed to solve the problem of replacing the wearing parts of a rotary seal without stripping down the shaft is the *Sectaflex*, made by Flexibox, Ltd. The makers say that replacement of worn parts only entails removing a few screws, taking out the old parts and inserting new ones, which can be done in a matter of minutes. Leakage rate is claimed to be extremely low and the seals can be used at pressures up to 100 p.s.i. and temperatures up to 300°F., provided that the vapour pressure at the operating temperature of the fluid being handled is less than atmospheric.



An exploded view of the "Sectaflex" split mechanical seal for sealing the glands of all types of rotary equipment. Parts subject to wear are split for easy servicing and maintenance.

The seal is a face-type mechanical seal in which sealing action is obtained by intimate contact between the rubbing surfaces of two assemblies, one stationary and the other rotating with the shaft. These components are each divided into two halves.

TRANSISTORISED RECORDER

A new compact, inexpensive, servo-operated recorder, the *Capacipoise Servograph*, available in A.C. or D.C., is announced by Fielden Electronics, Ltd. Two models are available, one requiring an external 12 volt D.C. supply and the other, incorporating its own power pack, which may be operated from the normal 240 v. 50 c.s. mains supply. Chart diameter is 6¼ in. Standard fitting is a central indicator pointer moving over an arc of 300°. One or two electrical contacts, which can be used for alarm or control, can be fitted, and other forms of control are available. Pen and pointer are motor driven, no errors being introduced by pen to paper friction or by the weight of the pen. Moving parts have been reduced to a minimum.

COLLAPSIBLE CONTAINER FOR BEVERAGES

A collapsible "beer barrel" that can be folded up when empty and returned at a return freightage of about one-fifth of that on a conventional cask has been developed by Light Alloy Construction, Ltd. Known as the *Tracon* container, it is a folding light alloy one-piece container having inside an expendable polythene bag which holds the beverage. When erected and loaded, the container can be sealed for security, and when collapsed to one-fifth of its erected size it is firmly held together by spring clips. It can be adapted for the carriage of powders, livestock, perishable food and bulk liquids. The makers say that it is strong enough to be dropped without damage from a height of 6 ft. when filled with 300 lb. of water.

The "Tracon" collapsible container made by Light Alloy Constructions, Ltd., can be used for beverages with the aid of an inner disposable polythene bag, and folds to one-fifth of its erected size.

Advances in Food Technology

ANALYSIS

Detection of malt in bread and pasta

In a 200 ml. flask place 10 g. of dried and ground bread, add 100 to 150 ml. of water and set aside at 40°C. for 30 min. Add 5 ml. of 15% $K_4Fe(CN)_6$ soln. and 5 ml. of 23% zinc acetate soln., shake, cool and make up to the mark. Filter, and determine the reducing sugars as maltose.—F. di Stefano and A. Vercillo, *Boll. Lab. Chim. Provinciali*, 1959, **10**, 111.

Rapid method for benzoic acid in soft drinks

Dilute the sample to give an expected concn. of about 4 p.p.m., of benzoic acid and filter, rejecting the first 50 ml. of filtrate. The extinction (x) of the subsequent portion is measured at 230 mμ. A blank measurement (y) is made with a prepared sample of the drink containing a known concn. (a) (p.p.m.) of benzoic acid. The concn. in the sample is then ax/y. The use of the reference standard prepared as described is essential because the unpreserved product, as well as having a characteristic extinction of its own at 230 mμ, has an influence on the extinction of benzoic acid.—E. English, *Analyst*, 1959, **84**, 465.

Rapid method for fat determination

Five g. of sample is weighed in a centrifuge tube and dissolved in 10 ml. of warm water. Benzene (2 × 15 ml.) is added to the cooled solution with a pipette, then the tube is stoppered, shaken and centrifuged. With the same pipette 15 ml. of the benzene layer is removed and evaporated at room temp., and the residue is dried at 100°C. and weighed.—I. Invernizzi and C. Sampietro, *Boll. Lab. Chim. Provinciali*, 1959, **10**, 27.

Sodium hypochlorite in milk

There was a 50% chance of detecting, by odour, sodium hypochlorite in milk after 2½ hours at 15°C. when the level of available chlorine added was 50 p.p.m. To be equally apparent after 18 hours it was necessary to add 70 p.p.m. Sodium hypochlorite markedly increased methylene blue reduction times in milk when the level of addition was 20 to 100 p.p.m. available chlorine and when the natural reduction time of the milk was less than 5 hours. With better quality milks (5 to 11 hours reduction time), there was only a slight increase in time and in fact at chlorine concns. of 80 and 100 p.p.m. methylene blue times were usually shortened. The results show that sodium hypochlorite in farm milk could significantly increase the methylene blue reduction time.—E. G. Pont and W. P. Rogers, *Australian J. Dairy Tech.*, 1959, **14**, 67.

Alpha-amylase activity of cereals

A simple and rapid method of determining alpha-amylase activity of flour and pulverised grain may be completed in 1-2 mins. Its principle depends on heating a flour-water suspension of 5 g. of flour in 25 ml. of water very rapidly to determine the time required to gelatinise and, subsequently, to liquefy the flour suspension. For practical purposes the "liquefaction time" is usually sufficient for evaluating the diastatic properties. However, from the "liquefaction time" is usually sufficient for evaluating the diastatic properties. However, from the "liquefaction time" and the "gelatinisation time," both of which may be determined in the same test, the "diastatic number" may be computed. The "diastatic numbers" for different flours are related linearly to the alpha-amylase activity over a broad range.—S. Hagberg, *Ceareal Chem.* 1960, **37**, 218.

CEREALS

Oil content of white flour

A sample of No. 2 Manitoba Northern wheat freed from germ by insect attack was laboratory-milled comparably with the control wheat. The two resulting straight-run flours gave similar baking results, except that the loaf from the germ-free sample had much the paler crust. Comparison of oil contents in corresponding flour streams indicated that in the control samples the following percentages of the oil contents originated from the germ: straight-run flour, 27; break flour, 24; flour from small middlings or dunst reduction, 23-24; flour from sizings (semolina) reduction, 34. These amounts were contained in (*a*) fragments of germ present in the flour and (*b*) endosperm particles to which oil had been transferred by expression from germ particles during reduction rolling. In the break flour, the germ oil contribution was mainly from (*a*); in the break middlings and reduction middlings (dunst) flours, mainly from (*b*); in the sizings (semolina) flour, from both (*a*) and (*b*). The straight-run flour contained in all, in forms (*a*) and (*b*), 30% of the oil initially present in the germ of the wheat. Its scutellum content was roughly 0.3%.—D. J. Stevens, *Cereal Chemistry*, 1959 (5), 36.

DEHYDRATION

Design of freeze-drying equipment

Equipment for the freeze-drying of foods on a large scale should have the following characteristics: simplicity of construction; quick loading, prevention of thawing during loading and pump-down; ability to run without supervision; ability to dry a variety of products of various shapes and textures; reasonably rapid drying; uniformly heavy loading of the vacuum chambers to make maximum use of pumping capacity.

A method of achieving these is by the use of chambers fitted with blackened shelves, electrically heated and movable so that the number of shelves and the space between them may be varied as desired. The material to be dried is laid on trays or between aluminium plates or, for layers thicker than ½ in., between plates fitted with aluminium spikes, and then frozen. For drying, the trays or plates are loaded between the heating shelves leaving a small gap of ¼ to ½ in. at the top and bottom. Thermostatically controlled radiant heat from the shelves provides efficient heat transfer for drying cycles of from 4 to 7 hours. Evacuation of the system may be by steam ejector or by mechanical pump plus ice condenser, depending on the facilities available.—W. R. Smithies and T. S. Blakley, *Food Technology*, 1959, **13**, 610.

EGGS

Baking quality

A series of tests over a period of 5 months of the general quality and baking properties of eggs showed that, apart from a striking difference in colour of the liquid whole egg, which was paler in the case of eggs from battery hens, only small differences in other properties, of no commercial importance, could be detected with eggs from free-range hens of the same parent stock.—S. J. Cornford and others, *J. Sci. Food and Agric.*, 1960, **11**, 115.

FISH

Chemical studies during spoilage

The seasonal variation of the free amino acids in herring is determined; histidine and taurine are quantitatively the most important. No correlation was found between sexual maturity and content of total or individual amino acids.

In post-mortem spoilage, the taurine content remained constant, but the histidine content after a slight initial increase dropped to zero. Histamine developed 40-50 h. after death. Three other imidazole-like compounds were also detected. Leucine, valine, alanine, glycine, threonine and glutamic acid increased, but lysine and serine decreased. Aspartic acid and tyrosine, and arginine and (?)methionine were apparent after 40 and 58 h. respectively.—R. B. Hughes, *J. Sci. Food and Agric.*, 1959, **10**, 558.

Browning of dehydrated and salt cod

The development of brown pigmentation, the disappearance of reactants and changes in the fluorescence of reaction mixtures of ribose with individual components present in cod muscle extractives have been measured These data are discussed, together with chromatographic evidence, in relation to general "browning theory." By reference to the known composition of the extractives of fresh and chill-stored muscle, the relative importance of the different nitrogenous compounds in the early stages of the "browning" of dehydrated and of salt cod is postulated. —N. R. Jones, *J. Sc. Food and Agric.*, 1959, **10**, 615.

MEAT

Effect of low-temperature cooking on quality

Five muscles from six pairs of U.S. Standard grade beef rounds were cooked, one of each pair at 63°C. (145°F.) for 30 hr. and the other at 68°C. (155°F.) for 18 hr. and evaluated by objective and organoleptic methods.

Meat cooked at 63°C. as compared with that cooked at 68°C. had a lower percentage of cooking losses, a higher per cent. moisture content and a lower protein. The nitrogen content of the press fluid was higher. The meat was significantly more tender as evaluated by the Warner-Bratzler shear and by a taste panel, and tended to be more tender as evaluated by tensile strength measurements of individual fibres. The press fluid yields and scores for juiciness, texture, and appearance were greater for meat cooked at 63°C., but flavour scores were not significantly different.

Significant differences were found due to muscle for: cooking losses, shear values and yields of press fluid; taste panel scores for tenderness and juiciness; and to animal for cooking losses, shear values, tenderness scores and press fluid yield. Differences due to animal approached significance for juiciness scores.—Vianna D. Bramblett, Robert L. Hostetler, Gladys E. Vail and H. N. Draudt, *Food Technology*, 1959, **13** (12).

MEAT PRODUCTS

X-Ray testing

Research has been carried out at the Jugoslav Institute for Food Hygiene at the Veterinary Faculty, Zagreb, on the testing of canned sausages by means of X-rays—*i.e.*, without opening the tins. It is thus possible to ascertain whether the cans contain a sufficient quantity of brine. By using the Potter-Bucky diaphragm, it is also possible to ascertain the exact dimensions of the canned sausages as well as any foreign particles contained in them, down to grain size. With the aid of X-ray testing, it is possible to eliminate cans with sausages in the initial stages of decomposition even before the cans begin to swell. For these tests, cheap X-ray paper can be used instead of expensive X-ray films.—Dr. B. Malcic and Prof. Dr. S. Rapic, *Die Fleischwirtschaft*, 1960, **12**, 23.

Smoke curing

The Central Food Research Institute, Prague, has carried out research on the possibilities of intensifying the smoke-curing procedure. It was found possible to obtain this effect by increasing the flow velocity of the smoking medium. This was proved in a series of 121 tests with a temperature range from 80 to 120°C., a humidity range from 2 to 3% and a flow velocity range from 0·2 to 8·6 metres per sec. The tests were carried out with an experimental smoking plant with forced recirculation flow and with friction smoke producer including measuring devices. Optimum velocity was found to be in the range of 5 to 6 m./sec. when the period of smoke curing is substantially shortened, weight losses of the products are reduced, and working expenses are at a minimum.—M. Adam, *Die Fleischwirtschaft*, 1960, **12**, 80.

Electrostatic Smoking

The underlying principles, the mechanism, the servicing and the mode of operation of equipment for the smoking of meat products by the electrostatic method are described.

Smoke particles become electrically charged in a high tension electrostatic field (WN) and the forces of the field guide them to the product placed on an earthed conveyor. The method reduces to a few minutes the time required for depositing the smoke particles on the product. It is also said to ensure the even distribution of the smoke and makes it possible to smoke several products with a hitherto unknown degree of accuracy.

The authors have compiled basic constants for the electrostatic smoking of sausage, taking into account the time of smoking, voltage between the electrodes, intensity of the electric field and emission current, as well as the temperature in the chamber, and processing before and after smoking.

The method is still under investigation and it is still an open question whether the method is a financial proposition compared with present practices. The method should only be used for continuous production.—D. Tilgner and Z. Sikorski, *Gospodarka Miesna*, 1958 (9), 3.

Influence of Antibiotics on Bacterial counts

The German Federal Meat Research Institute, Kulmbach, has carried out tests to ascertain whether the detection of salmonella and other micro-organisms is impaired by the presence of antibiotics remaining in the organs of animals fed with aureomycin. For this purpose, liver pulp and bile samples from sound animals were mixed with controlled quantities of gamma-aureomycin and inoculated with the species of micro-organisms to be tested. The samples were kept for one or two days at a temperature of +5°C. or +15°C. whereupon the change in the bacterial content was quantified and the growth determined colorimetrically. It was found that the bacterial content is influenced not only by the concentration of antibiotic but also by the keeping temperature. With samples stored at +5°C., the concentration of antibiotic did not play an important part. In contrast, the antibiotic had the effect of considerably reducing the bacterial content in samples kept at +15°C.—K. Coretti, *Die Fleischwirtschaft*, 1960, **12**, 185.

Fish Processing in Poland

(*Concluded from page 239*)

is of the tunnel type and the other half plate, of which some further technical details are given. Much attention has been given to ice production, for which the latest and most improved methods have been adopted, including mainly the Sabroe flake ice process, for which various advantages are claimed.—W. G. Cass.

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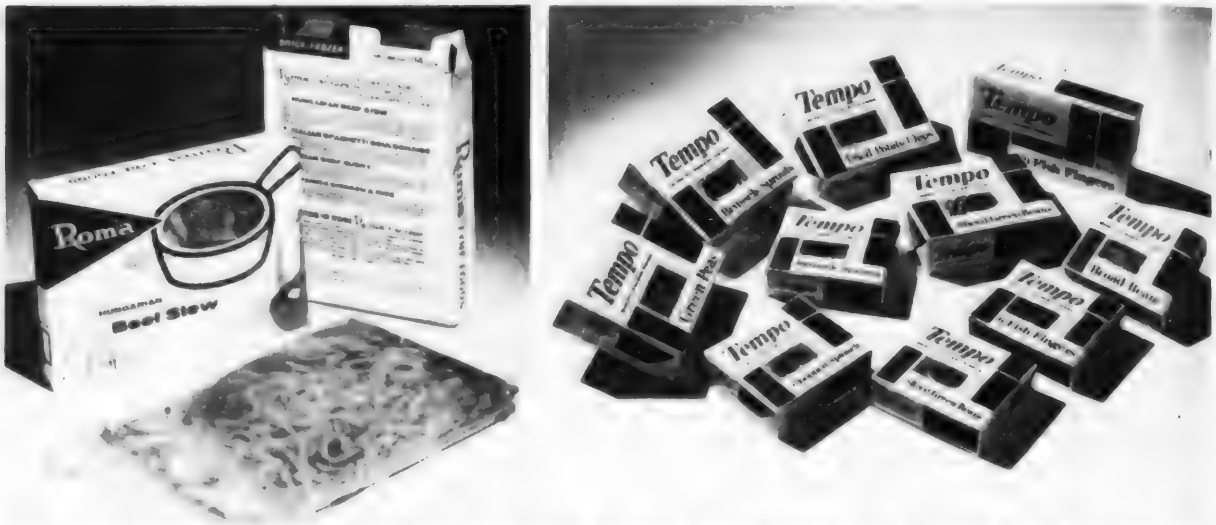
2. T. Skwarczynski, *Kältetech*, 1959, **11**, 203.

Packaging



(Left): **These boilable packs made by Metal Box are supplied in high-gloss waxed cartons made by Pearlite Box Co.** *(Right)*: **The frozen vegetables and the fish fingers in the "Tempo" range are packed in cartons overwrapped with waxed paper wrappers supplied and printed by the Robinson Waxed Paper Co.**

Boilable food packs

The Plastics Group of the Metal Box Company, Ltd., say they are supplying large quantities of 200 gauge *Densothene* bags for boilable food packs, containing Hungarian Beef Stew, Indian Beef Curry, Italian Spaghetti and Spanish Chicken and Rice, made by Roma Fyne Foods. These packs are quick frozen, and the material is claimed to be suitable by reason of its strength and flexibility at low temperatures. The outer carton, made by Pearlite Box Co., Ltd., has new-style lock ends, and is in 0·016 white lined board, high-gloss wax coated.

New frozen food range

The Times Food Products, Ltd., one of the Birds Eye group, has produced a new range of frozen foods under the brand name *Tempo*. The packs are of modern design which contrasts with the large-picture packs usually associated with frozen produce. All the packs bear similar designs, consisting of a white ground carrying several solid blocks of bold colours, with the name *Tempo* in large blue italics, and the variety specified in heavy black lettering. Illustration is restricted to small decorative line drawings, and cooking and storage instructions, etc., are printed in black on the reverse of the packs.

The five vegetables in the range and the pre-cooked chips are packed in *Kliklok* cartons overwrapped in waxed paper wrappers supplied and printed by the Robinson Waxed Paper Co., Ltd. These wrappers are printed in five colours on 20 lb. G.I.P., fully *Lustrawaxed* and supplied ready for heat-sealing.

New double pack

A new "double offer" pack—Fruit in Jelly and Cream—will be on sale all over the U.K. this month. The fruit jelly, made by Benedict, has been developed after two years' research, and the makers say that it will stand up to high summer temperatures without melting in the tin, and remain in ex-

These carriers for cans of beer, introduced by the Goebel Breweries of U.S.A., are intended to attract men and sportsmen in particular. Printed in full colour, they feature sporting subjects and have a foaming glass of beer skilfully incorporated with the name of the brewery.

(Left): **These vacuum-formed lids of Styron 440 polystyrene are now used by Express Dairy Co. for cheese containers. They have serrated edges for easy opening and provide a snap-on seal. Moulders are Mono-Containers, Ltd. The polystyrene is made by British Resin Products, Ltd.** *(Right)*: **An 11 oz. size has been added to the range of " Polycups " made by the Metal Box Co.**

Beaulah Benedict and Wilts United Dairies, Ltd., are jointly marketing their two latest products in a special banded "double offer" pack—Fruit in Jelly and Cream. The ⅝ in. wide Sellotape high-tack adhesive band which joins the two tins was designed and printed by Gordon and Gotch (Sellotape), Ltd.

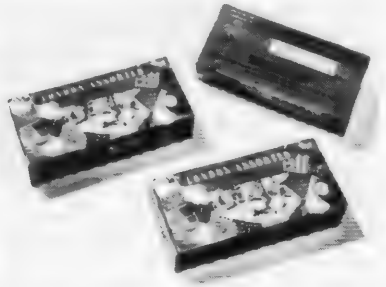
cellent condition even after long storage. The fruit jelly is marketed in a 10½ oz. tin in six flavours: Fruit Salad in Pineapple Jelly; Peaches in Orange Jelly; Cherries in Strawberry Jelly; Pineapple in Lemon Jelly; Prunes in Blackberry Jelly; and Pears in Lime Jelly.

Attached to the fruit jelly tin is a 4 oz. tin of *Winnie Wilts* cream, a product of Wilts United Dairies, Ltd. The double pack is banded together by a ⅝ in. wide printed *Sellotape* band, designed and printed by Gordon and Gotch (Sellotape), Ltd., which is applied by an automatic bundling machine.

This prize-winning Italian cake pack is held together by a quick-release stitching in the handle.

New addition to " Polycup " range

Metal Box now offer *Polycubs*, their disposable plastic cups, in an 11 oz. size in addition to the 7 oz. size. They are made either in white or semi-transparent high-impact polystyrene; the 11 oz. size has vertical ribs below the rim to make nesting easier. The cups are claimed to impart no flavour to hot or cold drinks served in them, are not easily broken and can be printed according to customer's wishes. They can be purchased in any quantity exceeding 1,000.



A new " Fiberfilm " pack designed and printed by the Robinson Waxed Paper Co.

High gloss biscuit wrappers

A heat-sealing film and paper laminate, RWP proprietary *Fiberfilm*, has been chosen for a new range of glossy wrappers for fifteen varieties of biscuits made by Elkes Biscuits, Ltd. The new designs are by the Robinson Waxed Paper Co., Ltd., and are printed in five- and six-colour gravure.

Italian cake pack

Bugnone of Turin has recently won a prize for a quick-opening cake pack designed for Motta of Milan. The pack is produced in 8 colour rotogravure on a paperboard/foil laminate which protects it from light and heat. The container has a handle so stitched that it holds the carton together. To open, a knot is snipped, the stitching pulled, and the package opens. It may be reused, and can be stored flat.

News Digest

Food Advisory Committee to be formed

Speaking at the Annual Luncheon of the Food Manufacturers' Federation on May 12, which was held at Grosvenor House, the President, Mr. J. P. Van den Burgh, C.B.E. (Unilever, Ltd.), thanked the Minister of Food and his advisers for listening to the Federation's grumbles and taking very positive action to remove their causes. After his remarks last year about "long-haired boys," the minister made a new appointment as chairman of "a certain committee," which was welcomed by the whole trade.

Mr. Hare had appointed, under the chairmanship of the Permanent Secretary, a committee to advise him on food problems requiring research or investigation, and had paid the Federation the compliment of inviting him to serve on this committee. The president went on to say that the Ministry have set an example on consumer protection in the food industry, persuading him to think that the Molony Committee need not have much to do in the food field.

In his reply, Mr. Joseph Godber, Joint Parliamentary Secretary to the Ministry of Agriculture, Fisheries and Food, who was deputising for the Minister, said that the Minister and his colleagues had decided to reconstitute the Food Standards Committee with the aim of making it more independent and of ensuring that equal and adequate representation is given to the interests affected. The committee would be a little smaller than previously and civil servants would cease to sit on it, apart from a representative of the Government Chemist. Apart from the Chairman, there would be three representatives of trade interests, three scientific members and three independents who would represent the interests of the consumer and also of the authorities interested in the enforcement of the Act.

Mr. Godber also referred to the Pure Food Centenary and to the 150th Anniversary of Canned Foods, and said that the last ten years had seen amazing developments.

Egg prepackaging

This season's final meeting of the Institute of Packaging's Egg Discussion Group was held on April 6 at the Packaging Centre. Mr. Pattison, the chairman of the Joint B.E.M.B./P.P.D.A. Egg Prepackaging Committee, stated that the 26 egg packs which had been submitted by industry through P.P.D.A. to the joint committee had now been seen by the Retailers Advisory Committee, the Joint Consultative Committee and the Packaging Committee. All were very impressed by the display and had asked him to express their very sincere thanks to the packaging industry for the very considerable efforts that they had made in such a short time to produce this wide range of different types of pack. Of the 26 packs put forward 10 had been submitted from overseas or were just being introduced commercially on the home market. The committees closely examined the 16 new packs, but felt some of them will require further developments.

These committees did not make any specific recommendations for individual packs to be used, but agreed that an independent panel of specialists should be invited to select six packs to go forward for transit testing. This panel consisted of three persons: a national figure in egg packaging; the merchandising manager of a very large retail chain; and the packaging advisor to a large food manufacturing group. None of these persons had previous knowledge of the packs put before them, neither did they know which companies had submitted the packs.

Transit tests are now envisaged for these six packs and work on establishing a norm for the transit test had already been commenced with keyes trays.

The B.E.M.B.'s intention is that eventually all eggs sold through the retailer will be prepackaged, and they hope to double the present 25% of eggs sold in this manner within six months of these new packs being put on the market. This increase would mean an extra 6 million prepacks per week.

The chairman pointed out that this field offered a vast potential to the packaging industry: approximately 1,200 million half-dozen egg packs per year would be required if all eggs sold to the consumer were prepackaged. Obviously this gave very real incentive to the packaging industry, and he, the board and P.P.D.A. were greatly indebted to them for their very considerable effort towards assisting the board to present eggs to the housewife in a more attractive and convenient manner.

Chemical agent approved

A circular (FSH 3/60 dated April 30) from the Ministry of Agriculture, Fisheries and Food states that *Alfa-Laval Hypochlorite* and *Alfaklor*, both made by Alfa-Laval Co., Cwmbran, Mon., have been approved for the cleansing of milk tankers, vessels or appliances as an alternative to scalding with boiling water or steam in accordance with Regulation 27 (6) (a) of the Milk and Dairies (General) Regulations, 1959.

British Standard for process vessel sizes

The object of a 30-page British Standard specification is to reduce substantially the number of differently dimensioned process vessels, thus reducing the amount of press and other equipment required for fabrication.

The capacity and dimensions of process vessels used in the chemical and allied industries are frequently selected arbitrarily and without any consideration of standardization. In some instances the dimensions are based on the size of charge with added space for boiling, etc., and are such that the vessel cannot be fabricated. In many cases the chosen dimensions are based on vessels made to metric sizes by continental suppliers. Thus confusion is heaped on confusion.

When vessels are made as castings it is possible and economic (within reason) to accommodate a great variety of sizes; this is because the mould is generally formed by comparatively inexpensive moulding tackle. But with the modern tendency to fabricate vessels from plate material, the cost of dies and other items for pressing to shape becomes a major charge. Standardization is the obvious answer to this problem.

B.S. 3161 specifies the dimensions of the following types of process vessel: vertical cylindrical open, vertical or horizontal cylindrical closed, and the so-called "boat" pans. The range is five to five thousand Imperial gallons. In order to overcome the confusion which exists in industry regarding the names applied to process vessels, the

standard includes a list of seven important terms.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. Price 7/6d. (Postage will be charged extra to non-subscribers.)

A.P.V.'s golden jubilee

On June 10 this year, the A.P.V. Company, Ltd., celebrates the fiftieth anniversary of its foundation. The company was started in Wandsworth, London, in 1910 by Dr. Richard Seligman, as the Aluminium Plant and Vessel Co., Ltd., to develop commercially a patent for the welding of aluminium. It was the first company to produce large vessels in aluminium as the industrial application of this metal had previously been handicapped by the difficulty in welding.

The subsequent development of welded fabrication in aluminium, and later in stainless steel, the invention of the *Paraflow* plate heat exchanger in 1923, and the growth of the company as process engineers, built the A.P.V. Company up as one of the leading manufacturers of process plant for the Dairy, Brewery, Food, Chemical and related Industries.

Today the A.P.V. Company employs nearly 2,000 people in its very modern factory at Crawley, Sussex, and it has created a large overseas organisation based on eight associated companies, four of them with their own factories.

During the whole of this 50 years of steady, healthy growth the A.P.V. Company has retained its independence, and its founder, Dr. Richard Seligman, although now retired from the chairmanship, is still with the company today as president.

New Birds Eye fish contract

Birds Eye Foods, Ltd., have made an offer to the Lowestoft Fishing Vessel Owners' Association, Ltd., for the purchase of cod and codling at a fixed price for the period from Easter Monday to July 31, 1960. The offer has been accepted.

Under the terms of the offer, it is expected that the Lowestoft factory of Birds Eye will buy double the amount of cod purchased by them during the same period in any previous year. At the same time they intend to continue their purchases at the auction markets.

It is believed that these increased purchases will absorb additional supplies landed by the larger fleet operating this year and that the extension of the contract into July will greatly reduce the danger of good quality fish being unsold on the market and so disposed of for animal feeding during periods of glut, as happened on occasions last year.

Mr. A. A. Morgan, assistant managing director of H. J. Heinz Co., Ltd., presided at a dinner given by Heinz at the Savoy on April 21 for members of the International Association of Chain Stores. Mr. F. J. Erroll, M.P., Minister of State at the Board of Trade, was the guest of honour. Mr. and Mrs. Morgan (left) *are here seen at the reception with Mr. and Mrs. Erroll* (right).

At the same time the arrangements are such that adequate supplies will still be available to meet normal market demand.

Standard for cheese cloth

A publication from the B.S.I. specifies minimum requirements for cotton cheese cloth, tubular woven cheese bandages and stiffened cheese caps suitable for bandaging material in the manufacture of cheese, primarily the Cheddar and Cheshire types.

The specification is based on cotton supplies currently in general use, a wide range of types of material is available; and the minimum requirements specified the outcome of full investigation and consideration constitute a guide towards the satisfactory bandaging and capping of Cheddar and Cheshire cheese.

It should not be inferred from this standard that a material of lower standard will invariably prove unsatisfactory, but such material will not necessarily give satisfactory results under adverse conditions.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. Price 4s. (Postage will be charged extra to non-subscribers).

Prince Philip visits Leatherhead Laboratories

H.R.H. Prince Philip, Duke of Edinburgh, paid an informal visit to the B.F.M.I.R.A. laboratories at Leatherhead on the afternoon of Friday, May 13. Arriving by helicopter, he spent two hours touring the association's laboratories after being welcomed by the President, Prof. A. C. Frazer, M.D., D.Sc., F.R.C.P.

In the main entrance hall were presented to him the officers of the association, Lt.-Col. G. R. Harding (Vice-President), Mr. C. O. Barber (Chairman of Council), Mr. G. B. Stancliffe (Deputy Chairman), Dr. F. H. Banfield (Director of Research) and Mr. D. H. Martin (Secretary).

Starting with the Chocolate and Confectionery Products Section, the Duke toured the laboratories and saw the Whale Products laboratory, the library, the Microbiological, Meat and Fish, Analytical, Oils and Fats, Jam, and the Pickles and Sauces laboratories.

After taking tea with the President and the Officers, the Duke was presented with a silver bacon dish to mark the occasion. The presentation was seen by all members of the staff, who lined the staircase, and after thanking everyone, His Royal Highness left by helicopter for Buckingham Palace.

Food in Parliament

The Government hope to introduce their new weights and measures Bill next session. Prolonged and complicated consultations with the interests affected—and also pressure on Parliamentary time—have prevented a Bill on these lines being presented before, M.P.s learned when they inquired about the cause of the delay.

One M.P., Mr. George Darling (Labour, Hillsborough), said that a number of traders and manufacturers who wished to introduce new methods of packaging and selling their products were experiencing difficulties because of the present situation. The fresh legislation should be speeded up, he urged, because the whole thing was set in motion more than ten years ago.

Mr. Reginald Maulding, President of the Board of Trade, expressed regret that it had not been possible to bring it forward this session.

The results of the survey of shopping habits which was carried out are not to be published, the Government has decided.

It was stated that, although the report provided some information of technical interest, it did not contain sufficient conclusions of general interest to justify publication.

M.P.s were told some time ago that to some extent the new Weights and Measures Bill will be based on the evidence obtained from this inquiry into the habits of the shopping public.

A large number of food manufacturing firms have shown "a lively interest" in developments at the experimental factory in Aberdeen where work on dehydration is being carried out. The project is to come to an end in March, 1961, and the research station (situated in Greyhope Road) will be closed down by the Government.

The Minister of Agriculture, Fisheries and Food (Mr. John Hare) believes the work on dehydration there can best be carried on now by private enterprise. Food manufacturing firms interested will be kept in touch with the development as long as the experimental factory is maintained, Mr. J. B. Godber, Agriculture Ministry Parliamentary Secretary, stated.

To advise the Government in deciding the priorities to be laid down for food research, a committee has been appointed under the chairmanship of the Permanent Secretary of the Ministry of Agriculture, Fisheries and Food, with a membership drawn from persons experienced in the food industry or qualified in the allied sciences.

Known as the Food Advisory Committee it will: "Advise on those food problems (except for fish, which is dealt with separately) requiring investigation or research which should be undertaken with the aid of public funds, and to make recommendations as to the priorities to be accorded to such problems."

Members are: Mr. Edward Capstick, Dr. D. P. Cuthbertson, Sir Charles Dodds, Mr. J. Douglas Hutchison, Mr. D. Lowe, Mr. Alan Sainsbury, Sir William Slater, Dr. J. A. B. Smith, Mr. T. A. H. Sycamore, Mr. J. P. Van den Bergh, Sir George Wilson and Mr. N. Wood.

This is the protective overall Wall's commissioned Hardy Amies to design for the women who work in their ice cream factories at London, Gloucester, Manchester and Edinburgh. Made of light blue sailcloth, it has a gathered back for freedom of movement. The long sleeves have elasticised wrists so that they can be pushed up, and the garment is a wrap - around which looks becoming on women of all ages, sizes and shapes.

New Knorr product

A new product from Knorr, White Sauce, is now on sale throughout the U.K. and retails at 1s. a packet. Made from flour, fat, monosodium glutamate, milk solids, edible starch and spices, it requires only ¾ pint of milk to turn the contents of one packet into a smooth white sauce which can be used alone or as the basis of several recipes.

G. and R. Gilbert, Ltd./Morton Machine Co., Ltd.

An agreement concluded between the above two firms enables Mortons to handle the sales and service of Gilberts' range of *Fyna* and *Pedigree* reel ovens, *Gilbert* tunnel ovens, double and single lap ovens, and other products. Factory trained engineers will be available at Mortons' Wishaw address to attend to any service that may be required.

Solartron—John Brown Automation, Ltd.

A new company formed by John Brown and Co., Ltd., and the Solartron Electronic Group has been launched to cater for the field of automatic supermarts and automatic order machines for warehouses. The chairman of the new company is Sir Norman Hulbert, M.P.

Designated milk areas to be extended

The areas in England and Wales in which all milk sold by retail must be "specially designated" milk (that is "pasteurised," "sterilised" or "tuberculin tested" milk) are to be extended on October 1, 1960.

The Minister of Agriculture, Fisheries and Food and the Minister of Health intend, subject to any representations that may be made, to lay before Parliament a draft Order "specifying" the areas mentioned below. In specified areas milk of special designation only may normally be sold by retail, but the Minister may authorise the sale of non-designated milk by retail, if it is at any time impracticable for specially designated milk to be supplied.

The areas concerned are:

Area 1—Consisting of the Urban District of Northallerton; and the Rural Districts of Bedale, Easingwold, Helmsley, Masham, Northallerton, Thirsk and Wath.

Area 2—Consisting of the Urban Districts of Colne Valley, Denby Dale, Holmfirth, Meltham, Penistone and Stocksbridge and the Rural Districts of Penistone and Wortley.

Area 3—Consisting of the Boroughs of Bishop's Castle, Bridgnorth and Ludlow; and the Rural District of Bridgnorth, Clun and Ludlow and the Parish of Churchstoke in the Rural District of Forden (the remainder of the Rural District of Forden is already a specified area).

Area 4—Consisting of the Borough of Dunheved, otherwise Launceston; the Urban Districts of Bude-Stratton and Holsworthy; and the Rural Districts of Broadwoodwidger, Camelford, Holsworthy, Launceston and Stratton.

PEOPLE

The Furness area of Lancashire and the North Riding of Yorkshire are now administered by MR. E. A. SWEETING from the northern regional office at 1 Meal Market, Hexham

*

MR. S. MACKENZIE has been appointed PIDA'S regional officer for Lancashire and Yorkshire in succession to MR. REX EDWARDS, who has joined headquarters as a deputy chief livestock officer. Mr. MacKenzie's office is at 23 Victoria Avenue, Harrogate.

*

MR. I. M. GILROY BAILLIE has joined Birds Eye Foods Limited as Advertising co-ordination manager in succession to MR. KEITH JACOBS.

Mr. Baillie was previously group advertising officer with the Reed Paper Group, having joined them in 1957.

*

MR. D. M. COLTART has been appointed manager of E. M. Denny and Company's Reading bacon factory—M. Venner and Sons, Ltd.

Mr. Coltart, a Londoner, joined the hundred years old curing firm of Venner's from another curing factory in the North of Ireland. Previously he was with a Yorkshire bacon firm which he joined in 1948 having completed his national service with the Royal Air Force.

*

MR. A. W. MARSDEN, M.SC., D.I.C., A.R.C.S., F.R.I.C., who was appointed organising secretary of the XV International Dairy Congress, has left the dairy industry after more than 10 years' service to international dairying. He has now been appointed the organising secretary of the II World Congress of Man-Made Fibres which will be held in London early in May, 1962.

MISS B. G. HULSEN, who was assistant secretary of the Dairy Congress, was also appointed to the Fibres Congress in a similar capacity.

*

MR. G. S. PRICE has been appointed despatch manager of W. and R. Jacob and Co. (Liverpool), Ltd., to succeed MR. H. FOSTER who has retired after 35 years' service with the company.

Mr. Price joined Jacob's in 1946 on demobilisation from the Army. Before his new appointment he was assistant packing manager and assistant manager of the export packing department.

Mr. Foster was despatch manager for nine years and during his many years with the firm was manager of the Newcastle and Liverpool depots.

Perry Como, the American singer who is under a 24-million dollar contract to Kraft Foods Company, Chicago, entertained executives of the British company during a recent visit. He was here to make a British edition of his Perry Como Kraft Music Hall programme. (Left to right): *Mr. Ben Chalmers, Marketing Director, Mr. George Pierce, Sales Director, Perry Como and Mr. Frost, Managing Director of Kraft Foods, Ltd.*

Mr. Keith Jacobs, who has been advertising co-ordination manager for the apointment within the company as a past 18 months, is taking up a new group product manager.

*

MR. GEORGE BEEBEE has been appointed Controller of the British Divisions of Yale and Towne, effective from April 1. He succeeds Mr. Sewell.

A native of the West Midlands, Mr. Beebee has been with Yale and Towne for 12 years since he left the Royal Air Force. He is 34.

*

MR. J. YOUNG, F.R.I.C., M.I.CHEM.E., retired at the end of March from his post as general factory manager at the *Ovaltine* works of A Wander, Ltd., at King's Langley. Mr. Young has been 41 years with the Company, 23 years as Factory Manager. He has been succeeded by MR. R. W. PEEVERS, B.SC., A.R.I.C., who has resigned his previous post as works director of British Schering Manuafacturing Laboratories to take up this appointment.

Obituary

Mr. L. P. James, chairman and managing director of the British Hydrological Corporation, died suddenly on April 10.

*

Dr. John Duckworth, head of the applied biochemistry department of the Rowett Research Institute, Aberdeen, died on April 11. Born in Manchester, but educated in Canada, he had been associated with the work of the Rowett Institute for more than 25 years. He lectured widely on nutrition, and during the last war, among many problems, he did work on oatmeal as a staple food.

B.S.I. colour analysis methods

Prepared by a technical committee representative of dye manufacturers, food manufacturers, Government departments, and scientific and professional organisations, a British Standard provides a set of methods for all concerned with the examination of food colouring matters.

At the request of the Ministry of Agriculture, Fisheries and Food, the British Standards Institution has undertaken the preparation of specifications for the colouring matters permitted for use in foods by the Colouring Matter in Food Regulations, 1957. These regulations name 29 dyes manufactured from coal tar, together with caramel, cochineal colour, various colouring matters of vegetable origin, and certain pigments and lakes.

As an essential step in this work, appropriate methods of analysis which are generally applicable to the water-soluble coal-tar dyes in the permitted list have been collected in B.S. 3210, to which reference will be made in subsequent British Standards covering the individual colouring matters.

Copies of this Standard may be obtained from the British Standards Institution, 2, Park Street, London, W.1. Price 7s. 6d. (postage extra to non-subscribers).

New egg company

Bennett Opie, Ltd., and J. J. Moore (London), Ltd., together with their subsidiary egg packing companies have amalgamated and formed Bennett Opie and Moore, Ltd. The new company will control the annual distribution of well over 100 million eggs in London and the Home Counties.

Their registered offices are at Burghley Road, Kentish Town, London, N.W.5.

Food News Overseas

Advisory Nutrition Council for Vietnam?

A nutrition council to advise the government of Vietnam on nutritional policy and problems has been recommended by an F.A.O. consultant just returned from a three-month assignment in Vietnam.

Professor M. J. L. Dols, cabinet advisor to the Minister of Agriculture and Fisheries, the Hague, said that he recommended the establishment of such a council while visiting Vietnam as a nutrition consultant for F.A.O.'s Nutrition Division. The recommendations are included in his report, which is being prepared for submission to the government of Vietnam.

"I was very pleased with the reception given to the recommendation of a nutrition council by high officials in the government," said Professor Dols.

Professor Dols was sent to the Far East to work with and advise the Vietnamese government on a number of nutritional problems and problems of education in nutrition.

The nutritional council, as proposed by Professor Dols, would consist of representatives from the ministeries of agriculture, health, education, economy, defence, from the offices of the budget and general planning, Parliament, the President of Vietnam and from the women's associations.

The council would include a technical group which would make preliminary recommendations based on nutritional needs. The council itself would then evaluate these on the basis of governmental policy, economic and financial possibilities.

Professor Dols also recommended that education in basic nutrition start at the college level and extend to the primary grades. His investigations showed that the Vietnamese diet, which consists of rice for 75% of the people, is unbalanced, consists of far too much carbohydrate, and may be lacking in vitamins, particularly thiamin and riboflavin.

He also recommended that nutritional education be extended to midwives, nurses and those in the public extension service. Lack of nutritional knowledge now leads Vietnamese women to avoid meat, vegetables and fruits while pregnant.

Professor Dols has left Rome to return to his post with the Dutch government.

Polythene cover for cannery lagoon

A perplexing problem long faced by tomato and other food canners in the U.S.A. has been solved by the novel use of a large blanket of polyethylene film.

Many canneries are located at some distance from municipal sewage systems and must dispose of waste by dumping it into a lagoon dug for that purpose. The decomposing vegetable matter in the waste lagoon makes an ideal breeding place for flies, and, in the absence of control measures, the fly population grows at an accelerated rate throughout the canning season. Until recently, the only feasible solution to this problem has been a spraying with a larvicide. This, however, gives only partial control.

In a new approach to this problem, the waste lagoon is covered with a blanket of black polyethylene film. In tests conducted to date, the plastic cover gave 100 per cent. fly control, as well as cost savings. The system was developed by Professor C. D. McCoy of the Purdue University Agricultural Experimental Station at Lafayette, Indiana, U.S.A. He fabricated a large blanket, 100 by 144 ft., of polyethylene film to cover the lagoon of a tomato cannery in nearby Eaton, Indiana. The polyethylene blanket was installed in a half day by four men. During the entire season, no flies were observed at the lagoon, and city and country officials considered that the polyethylene blanket gave perfect fly control.

"The packaging consultant has arrived, sir."

The polyethylene film proved to be easily manageable. The cover withstood wind, rain and gaseous fermentation products of the decaying vegetable waste.

Film used in the tests was extruded from resins produced by Union Carbide Corporation.

Giant oil mill for Nigeria

According to a Barclays Bank D.C.O. message from Lagos, a giant oil mill, believed to be the largest in West Africa, is being installed at a cost of over £400,000 at the Apoje Plantation by the Western Nigerian Development Corporation. When completed the mill will process over 25,000 lb. of palm fruit every hour.

Whaling results not so good

Final reports from seven of the eight Antarctic whaling expeditions show a production of 45,000 tons of whale oil and 8,400 barrels of sperm oil. This makes a total production of 588,130 barrels which is 85,315 barrels less than the previous season. The same factory ships have had a production of 62,855 barrels of sperm oil, i.e. 15,474 barrels less than the year before, outside the season.

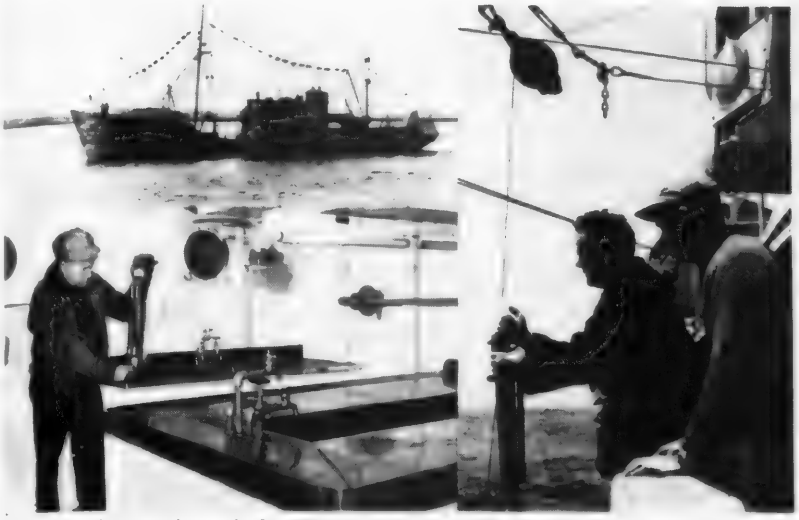
First grain shipments to Dominican Republic

Two ships with the first grain for milling ever imported to the Dominican Republic arrived at Ciudad Trujillo recently. They carried Canadian grain which will be blended for bread and self-raising flour by the new mills, Molinos Dominicanos. Bran is also to be produced, for export.

Floods of Pepsi-Cola

The Pepsi-Cola company in America have just announced that earnings after taxes in 1959 rose 20% over those of the previous year. The president, Mr. Herbert L. Barnet, says that earnings at $13,873,843 are the highest in the history of the company. Sales, up 15% during the twelve months, also established a new record. Mr. Barnet in his statement says that 1959 marked the tenth consecutive year of Pepsi's growth. In each of those ten years, beginning with 1950, both home and foreign sales reached record levels.

The company now has more than 200 plants overseas and 30 new plants will be opened during 1960.



Under the auspices of the University of North Carolina Fisheries Research Institute, the research trawler Albatross III *of the U.S. Fish and Wildlife service is carrying out deep-water investigations to find out whether extending offshore fishing into waters hiterto fished commercially would be worth while. The vessel is equipped with plankton nets, and contains a laboratory for analysis of the catches. It is possible that if the investigations yield positive results, North Carolina, already the leading sea food producer in south-east U.S.A., might triple its catch. The photos show:* (Top, left): *The "Albatross III" in Boston harbour after commissioning.* (Bottom, left): *Capt. Marvin O. Rice examining a Nansen bottle in the vessel's laboratory.* (Right): *Lowering a Nansen bottle for obtaining a sample from the sea.*

American flavour expert in Germany

West Germany's Justus Liebig University of Giessen has invited Dr. Jean F. Caul, senior project leader in the Food and Flavour Department of Arthur D. Little, Inc., in Cambridge, Massachusetts, to introduce a new method of analysing flavours and odours at its Institut für Ernährungswissenschaft (Institution for Nutritional Research).

Dr. Caul is spending three months at the Institute teaching the "flavour profile" method of analysis developed by Arthur D. Little, Inc. This method is used by taste-testing panels to detect flavour and odour problems and to develop new products and improve old ones. Her project, jointly financed by the University and ADL, will train the first European food team in this analytical method.

International meeting on smoke curing

A second international session on smoke curing will be held at the Institute of Animal Products Technology, Politechnika Gdanska, Poland, to encourage the interchange of ideas in this fundamental process. The programme will include: generation and modifications of curing smoke; penetration of smoke components and their interaction with the constituents of the smoked product; the effect of different smoke curing conditions on quality; and industrial applications of advances in technology and equipment.

Publications dealing with the smoke curing process, as well as instruments and equipment, will be exhibited.

The attendance is expected to total over 80 specialists from 12 research institutes and 9 countries. The first international session at the Politechnika Gdanska in 1950 gave ample opportunity for discussions between representatives from West and East.

Russia buys French sugar mills

Société Five-Lille-Cail, of France, has signed a contract in Moscow for the delivery of 3 complete sugar mills to the U.S.S.R., each with a capacity for processing 5,000 tons of sugar beet a day into refined sugar and by-products. The plants should start to operate in early 1963.

Société Five-Lille-Cail signed the contract as pilot-contractor for a group of French manufacturers who are constructing the necessary equipment with a total weight of 26,000 metric tons. The order represents a total amount of nearly $35 million.

Kenya bacon for Aden

The Uplands Bacon Factory (Kenya), Ltd., has sent a representative to Aden, the newest market for Kenya bacon. He is J. M. M. Harvey, a sales executive with the factory in Nairobi.

He will remain in Aden for 3 to 6 months to put the office on a sound footing and expand the sales of Kenya bacon in Aden as much as possible.

OBITER DICTA

● Little girl observing a budgerigar in a pet shop: "Mummy, there's a canary, but it's not ripe."—*Woman's Own.*

● Overheard at the Tea Centre in Lower Regent Street:—"Do you sell coffee?"—*Peterborough in Daily Telegraph.*

● We live in an age that may be referred to as the decline and *pall* of the American palate.—*News Chronicle.*

● It is irritating to be serenaded by a gipsy violin while grappling with a lobster and most up us prefer a Chambertin to a *chanson* with a Châteaubriand.—*Daily Telegraph.*

● As a nation we are eating far better now than we were before the war. More protein foods—meat and eggs and cheese. I see that Dr. Barbara Moore calls them poison. Well, I can only say that most of us seem to like our poison.—*The Rt. Hon. John Hare.*

● Hampstead greengrocer, thoughtfully, after serving the wife of a well-known politician: "Funny, *she* buys South African pineapples one day and he speaks in favour of the boycott the next." — *Peterborough in Daily Telegraph.*

● Turning down an M.P.'s request that Commons menus should identify all items of South African origin, the chairman of the Kitchen Committee, Sir Herbert Butcher, said: "I would advise members who may desire to practise the boycott to avoid the fruit salad in the near future."—*Daily Express.*

● Reprimanding a 25-year-old soldier who, after drinking "14 or 16 pints of beer," climbed into a bed occupied by the wife of a friend, still wearing "his boots, all his clothes and a long overcoat," a Bristol judge remarked sternly that "No one who has heard this case can think other than that you behaved extremely discourteously."—*Peter Simple in Daily Telegraph.*

● The two continued their cross-talk act when the effect of toxic agricultural sprays on the honey crop was introduced. Sir Godfrey asserted: "There is great concern among bee-keepers about the destruction of bees by these chemicals. If you like I will bring a deputation of angry bees to see you about it." Replied Mr. Godber: "I should be happy to see Sir Godfrey, but as regards his constituents I should treat them with some care."—*Daily Telegraph.*

New Companies

Peak Dehydrates (London), Ltd. (649001.) To carry on the bus. of mnfrs., processors and purveyors of and dlrs. in dehydrated vegetables, meats, etc. £5,000. Dirs.: Christine Demby, Johannes L. Nederlof, Charles H. Payre and Dudley L. King.

Spices and Aromatics, Ltd. (649702.) Westgarth, 13, New Road, North Walsham, Norfolk. To carry on the bus. of mnfrs. of and dlrs. in spices, aromatics, flavouring essences, etc. £100. Dir.: Thomas W. Cooke.

E. W. Billington and Co., Ltd. (649736.) 187, Langney Road, Eastbourne, Sussex. To carry on bus. of confectioners, tobacconists, provision dlrs., mineral water, soft drinks and ice cream makers and vendors, etc. £1,500. Dirs.: Cyril E. Billington and Mrs. L. H. Billington.

Island Waters, Ltd. (649749.) 3, Quarry Street, Guildford. To carry on bus. of brewers and distillers, and mnfrs. of aerated waters, beverages and cordials; bottlers of beer, cyder, wines and spirits, etc. £1,500. Dirs.: Ian C. MacDonald and Jean W. MacDonald.

Processed Sugar Foods, Ltd. (649902.) 16, John Dalton Street, Manchester, 2. £10,000. Dir.: Jack Ross.

Bolton and Skidmore, Ltd. 650231.) 120-121, Newgate Street, London, E.C.1. To carry on bus. of mnfrs. of and dlrs. in ice cream, aerated and mineral waters, etc. £100. Dirs.: James F. Bolton and Graham G. Skdimore.

Weinoc Enterprises, Ltd. (647472.) 10, Bury Street, St. Mary Axe, E.C.3. To carry on bus. of planters, cultivators, growers and mnfrs. of and dlrs. in rubber, cotton, tea, coffee and cocoa and other Eastern and Colonial products, etc. £100. Dirs.: Jas. A. Wharton and Louisa M Dixon.

Bernard Harris (Sweets), Ltd. (647611.) 69, Grosvenor Place, W.1. To carry on bus. of confectioners, tobacconists, mineral water and soft drinks dlrs., ice cream makers, etc. £100. Dirs.: Henry Gold, Bernard Harris and Susan Harris.

Polo Refrigeration and Electrical Appliances, Ltd. (646810.) £300. Dirs.: Howard R. Harper and Mervyn T. Harper.

Butlers (Meat Products), Ltd. (646823.) 57, Charterhouse Street, E.C.1. £1,000. Subs.: J. W. Butler and Thomas L. Cox.

Midland Frozen Foods (Distributors), Ltd. (646851.) 4, Frederick Road, Edgbaston, Birmingham, 15. £5,000. Dirs.: George E. Wake, Vincent J. T. Sorge, Lewis J. Mayling, William H. Garbett, Herbert R. Ashford and Edward M. Ashford.

N. Furnival and Co., Ltd. (647701.) Kilby Road, Fleckney, Leicestershire. To carry on bus. of mnfrs. of and dlrs. in mineral and aerated waters, cordials, syrups, cider, perry, wines, beers, spirits, etc. £10,000. Dirs.: Thomas H. Bond and Susie B. Bond.

Coolflow, Ltd. (647799.) 77, Hanson Street, W. 1. To carry on bus. of mnfrs. of and dlrs. in refrigerating and cold storage machinery, plant, etc. £100. Dir.: Trevor E. Thomas.

L'Alsacienne (Biscuits), Ltd. (647895.) 37, King Street, W.C.2. £100. Subs.: John A. Steemson and Winifred M. Isaac.

Royal Victoria Sausages, Ltd. (647906.) 11, Victoria Terrace, Kingsway, Hove, Sussex. £1,000. Dirs.: Dennis H Loraine and Mrs. Mollie Loraine.

Laudauer and Co. (Newcastle), Ltd. (647953.) To carry on bus. of canners, packers, freezers and preservers of fruit, nuts, vegetables, poultry, fish, groceries, etc. £10,000. Subs.: Miss Adelaide R. Dick and Edk. W. Burton.

Smiths (Gravesend), Ltd. (647973.) 130, Milton Road, Gravesend, Kent. To carry on bus. of bakers, pastrycooks, flour millers, mnfrs. of and dlrs. in bread, biscuits, etc. £10,000. Dirs.: Ernest A. Smith, Frank R. Smith and Horace B. Harris.

Fulljuice, Ltd. (648081.) To carry on bus. of mnfrs. of and dlrs. in ice cream and ice confections, etc. £100. Subs.: Jean Herbert and Thos. A. Herbert.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

Technical Press Review

June

Manufacturing Chemist. — Flow Measurement and Control; Sulphosuccinates; Memoirs of an Industrial Chemist—3; the Fight against Cancer.

World Crops.—Tropical Pest Control; Coffee Leaf Rust Disease; Insect Pests of Coconut Palm; Pyrethrum Cultivation in Kenya.

Chemical and Process Engineering.—Cryogenics Research and Engineering; Materials Construction—Lead; Design of a Solvent Extraction Plant; Utilisation of Waste Sulphite; Hardboard for Neutron Shielding.

Dairy Engineering.—Recent Developments in Aluminium Equipment; How Plastics serve the Dairy Industry; Galvanised Steel for Dairy Plant; Care of Aluminium; Practical Cleaning Routines—5.

Automation Progress. — Machine Tool Exhibition; Modern Resistance Welding; Servo Motors; Automation on the Railways—3; Handling of Wood in a Sawmill; Auto Inspection Devices.

Paint Manufacture. — Polyester Resins in Wood Finishes; Advanced Paint Chemistry—10; Paint Industries of the Outer Seven.

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For specimen copies write to Leonard Hill House, Eden Street, London, N.W.1.

Trade Marks

LA GIRAFFA.—782,561. Tomato purée and tomato extracts, all for food. **Giuseppe Tanzi and Lazzaro Tanzi,** trading as **Tanzi Cav. Primo,** Broni, Pavia, Italy.

LIN CAN.—786,113. Preserved dried, canned and frozen vegetables and fruits; and soups. **Lincolnshire Canners, Ltd.,** 41, London Road, Boston, Lincolnshire.

SEA KITCHEN.—796,739. Dried fish. **Joe Croan, Ltd.,** trading as **Sea Harvest Products,** West Shore Road, Granton, Edinburgh, 5.

MUSKETEER.—796,029. All goods included in Class 29. **Henry W. Peabody and Co. of London, Ltd.,** 16, Eastcheap, London, E.C.3.

FRINOL.—797,745. Margarine, cooking fats and edible oils included in Class 29. **Clyde Oil Extraction, Ltd.,** King George V Dock, Glasgow, S.W.1.

COCHE NEGRO.—B788,503. Edible oils and edible fats, all derived from pigs and all being for sale in British Honduras. **Unilever Export Naamlooze Vennootschap,** Museumpark 1, Rotterdam, Holland.

TATER TOTS.—B794,377. Preserved, dried, frozen and cooked potatoes. **Ore-Ida Potato Products, Inc.,** 789, North East 1st Street, Ontario, State of Oregon, United States.

CHOXIES.—795,078. Flour confectionery. **W. J. Brookes and Sons, Ltd.,** Skerton Road, Old Trafford, Manchester, 16.

ELDORADO TREATLETS.—795,543. Ice cream, water ices and iced confections. **Eldorado Ice Cream Company, Ltd.,** 14, West Smithfield, London, E.C.1.

WITCHCRAFT. — 796,200. Non-medicated confectionery. **Osborne-Peacock Company, Ltd.,** 26a, Albemarle Street, London, W.1.

SCOTTIE.—795,752. Sandwich biscuit covered with milk chocolate. **Blades (Bacup), Ltd.,** Albert Mill, Bacup, Lancashire.

LOLITA.—797,854. Ice cream, ice cream confections, mixtures for use in making ice cream, and water ices. **J. Lyons and Company, Ltd.,** Cadby Hall, London, W.14.

APPLEGARTH.—B773,244. Preserved fruits, preserved vegetables; jellies (for food), jams, fruit preserves, vegetable preserves; and pickles. **J. A. Ellison,** 53, Parkview Court, Fulham High Street, London, S.W.6.

SUN-PAT INSTANT SNAPS. —793,770. All goods included in Class 29. **H. S. Whiteside and Company, Ltd.,** Parkhouse Works, Parkhouse Street, Camberwell, London, S.E.5.

ROYAL PLUMAGE.—793,542. Canned fruits. **David Taylor and Son, Ltd.,** 14, Eastcheap, London, E.C.3.

STARLIGHT. — 794,401. Preparations consisting principally of vegetable oils; and edible preparations of milk; all for use in bakery goods. **Buckinghamshire Margarine and Produce Company, Ltd.,** 238, Bath Road, Trading Estate, Slough, Buckinghamshire.

HEYDAY. — 796,664. Canned meats, bacon, dead poultry and dead game. **Heywood and Son, Ltd.,** 1, London Bridge Street, London, S.E.1.

JACKAROO.—797,977. Butter. **Gordon J. Stephenson, Ltd.,** 78, May Street, Belfast, Northern Ireland.

99.—743,339. Wafer biscuits. **Askeys Premier Biscuit Company, Ltd.,** 290, Kensal Road, London, W.10.

Number 22 June 1960

Specialised Products (No. 2)

LODERS and NUCOLINE LTD.

INFORMATION BULLETIN

This advertisement is one of a series of Information Bulletins issued by Loders & Nucoline Ltd. Copies are available, together with a folder, on request to Loders & Nucoline Ltd., Unilever House, London, E.C.4.

EXTRACOA

Description

Extracoa is a high quality vegetable stearine butter manufactured to rigid specifications from specially selected raw materials. It is white, tasteless and odourless and melts readily in the mouth without leaving a waxy taste. Its short melting point range and other physical properties make it an ideal substitute for cocoa butter.

Uses

In Chocolate. Extracoa is recommended for use in the manufacture of best quality cocoa butter replacement chocolate. Replacement chocolate coatings, bars, Easter eggs, moulded novelties, drops and vermicelli can all be made with it, using low fat content non-alkalised cocoa powder. The resultant chocolate will be suitable for use in temperate climates and will have good snap, pleasant eating qualities and good resistance to fat bloom. Extracoa can be used to a small extent as added fat in chocolate made with cocoa butter with no detriment to the finished chocolate.

In Toffees. Extracoa is also recommended for the manufacture of low boiled toffees and caramels especially where a large percentage of cream or dairy butter is used and where a long shelf life free from grain is required.

In Centres and Sweet Coatings. Non-chocolate coatings for sweets can be manufactured with Extracoa giving a coating with a high gloss, good eating characteristics and completely free from bloom over long storage periods.

Centres for chocolate eclairs and toffees which have a flavoured centre can be made with Extracoa.

In Fondant Icings. Fondant icings for cake covering are improved by the addition of Extracoa which imparts a high gloss and prevents the coating from sticking to the cellophane wrapper. It will also prevent loss of moisture, cracking of the surface of the coating and will preserve the soft eating quality of the fondant.

Notes

It is essential that the correct recipes, raw materials, and methods of manufacture, tempering and cooling be used in order to obtain the best results with Extracoa.

Full details based on the wide experience of the Loders Technical Service are available on application

TYPICAL PHYSICAL CONSTANTS

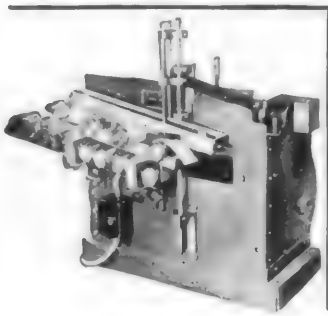
Iodine Value	5.5
Sap. Value	249
Setting Point	30.0°C.
Slip Point	31.5°C.
Complete Fusion	33.0°C.

LN 65-8058

Stick by NEWMAN for better labelling

The new NEWMAN LABELLING MACHINES

NEW EXTENDED RANGE LABELLING MACHINE MODEL 24A. Versatile Semi-Automatic Bench model Gums and applies labels maximum size 7" x 5½" to a wide range of bottles, etc., up to quart size. Automatic label coding available. Speeds up to 40 per min.



AUTOMATIC BENCH MODEL 4B. LABELLING MACHINE for small bottles, vials, cans, tubes, etc., $\frac{7}{16}$"—2½" diameter, labels up to 7" wide. Speed 40 per min. Only 2 ft. bench space needed.

See our display at the
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Open weekdays from 10—6

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the processed soya flour

'Trusoy', an entirely natural food astonishingly rich in protein and fat, will give you higher quality products with longer keeping qualities—and will reduce your production costs. Ask for test samples of 'Trusoy', the processed Soya flour.

ANALYSIS		%
	Moisture	9.42
	Protein	39.94
	Oil	19.02
	Phosphatides	1.90
	Non-reducing sugars	10.33
	Reducing sugars	Trace
	Other carbohydrates (not starch)	13.14
	Fibre	1.80
	Ash	4.45
		100.00

BRITISH SOYA PRODUCTS LTD
3 High Street, Puckeridge, Hertfordshire
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Also manufacturers of 'BREDSOY', B.S.P. IMPROVER, 'GOLDCRUM', 'BUNKUM'.

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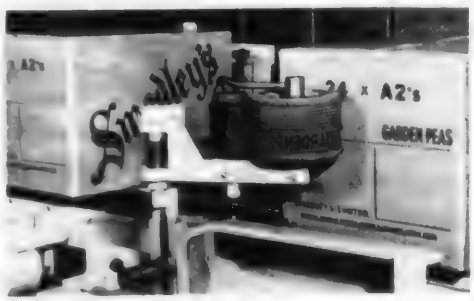

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Will automatically imprint code-dates or contents on large or small cartons or paper sacks. Several models available to suit different applications.

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Automatically re-inks the type after each impression. Uses BASELOCK rubber type in any size.

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terpeneless essential oils

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- CLOVE ENGLISH AND FOREIGN
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THE NON-TOXIC ANTI-STICK
IN THE PRESSURISED AEROSOL

An occasional squirt of Ambersil Formula One Silicone Spray applied to your Packaging Machinery will prevent wax build-up.

Ambersil Formula One is a pure methyl silicone fluid which, being colourless, odourless, tasteless, non-toxic and chemically inert is ideal for use on Food Packaging Machinery.

Ambersil Formula One is a first-class "anti-stick" for any purpose; apply it wherever sticking must be avoided.

A LITTLE SQUIRT
STOPS THAT WAXY BUSINESS!

Price details per aerosol:—
18 - singles, 17 - ½ doz., 16 - doz., 15 - 2 doz., 13 6d. gross.

AMBER OILS LTD., 11a ALBEMARLE STREET, LONDON, W.1. MAYfair 6161/3.

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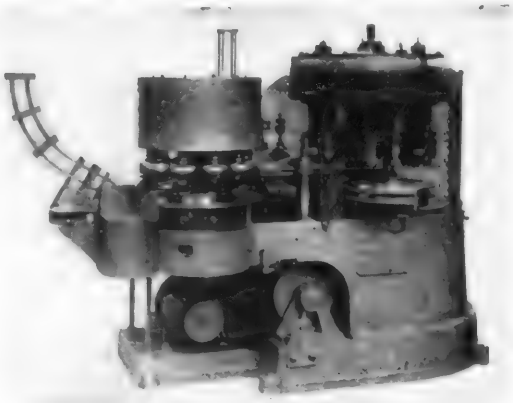

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Can be supplied with 10-head liquid filler as shown in illustration. Steam glow attachment also available.

Write for details of this machine and of our vacuumising and closing machines, turntable soldering machines for tagger lids and gas charging boxes.

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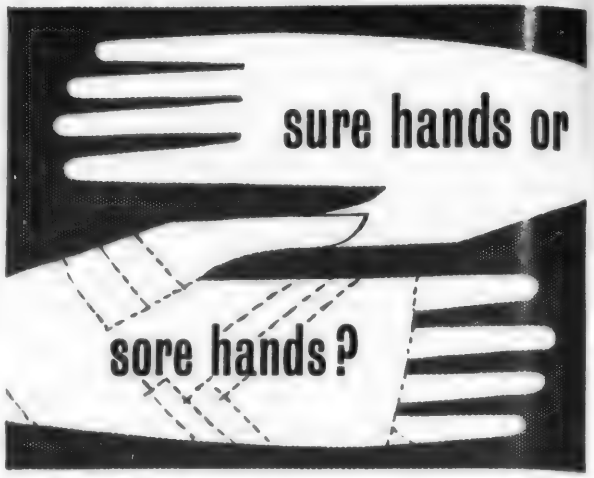

The preparation of food is unkind to the hands. Rozalex Barrier Cream No. 10 has been developed for use by bakers, confectioners and the food industries generally, to provide protection against fruit juices, sugar, vegetables and other food stuffs. It is water-resistant, contains no perfume and cannot contaminate food in any way.

Also available—Rozalex Fruit Stain Removing Cream.

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MACE, NUTMEGS, GINGER, CINNAMON, ETC.

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EASTCHEAP, LONDON, E.C.3

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2 NSF grade

A pectin of standard "Elpex" setting strength but specially prepared for the darker jams where maximum clarity is not essential.

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For specialised products such as Jelly marmalade.

4 LIQUID SLOW-SET PECTINS

PLEASE HELP SPASTICS

Guaranteed setting temperature. Specially suited for 7's, 14's and bulk packs of jam where ordinary pectin causes caramelisation and pre-setting.

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Full range available including Rapid Set, Slow Set and Low Methoxy

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The "Musquash" is a most versatile creature to have around the store. Carpet shampooing, wet scrubbing, mopping, dry cleaning, light sanding and polishing . . . the "Musquash" will do the lot on *any* type of surface. It will even scrub or polish *under* free standing fitments, and *under* furniture. No need to stoop. No need to clear the floor. Then there's the "Otter"—the only battery-driven floor scrubber that scarifies or polishes. Ideal for large expanses of heavy-traffic floors. The "Musquash" and the "Otter" are but two of the B.V.C. family of Floor Maintenance Equipment. The full range deals with every floor cleaning problem.

B.V.C.

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Dept. FME/F5, Goblin Works,
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One of the Goblin (B.V.C.) Group of Companies

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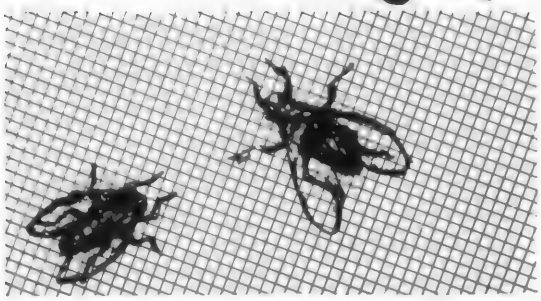

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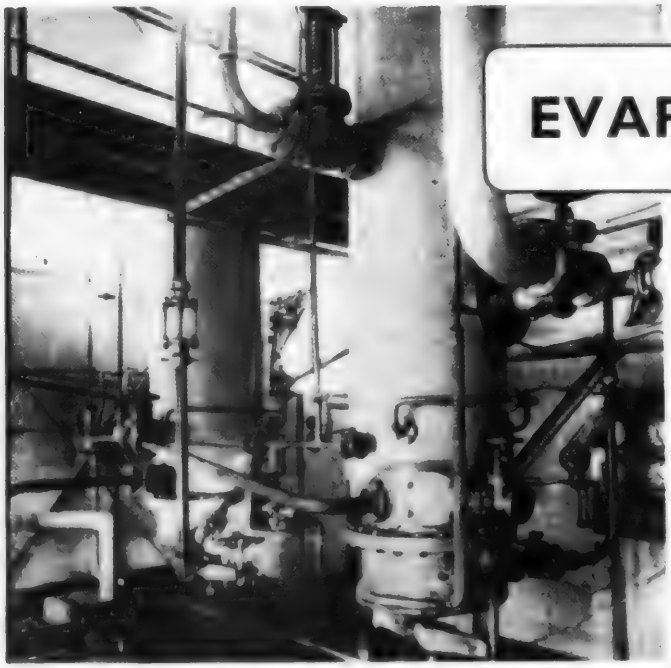
Branches at Birmingham, Manchester, Scotland and Eire.



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INDUCED FLOW STIRRERS AND MIXERS for handling sauces, soft drinks, salad cream, syrups, cooking fats, ice-cream, fruit juices, etc.

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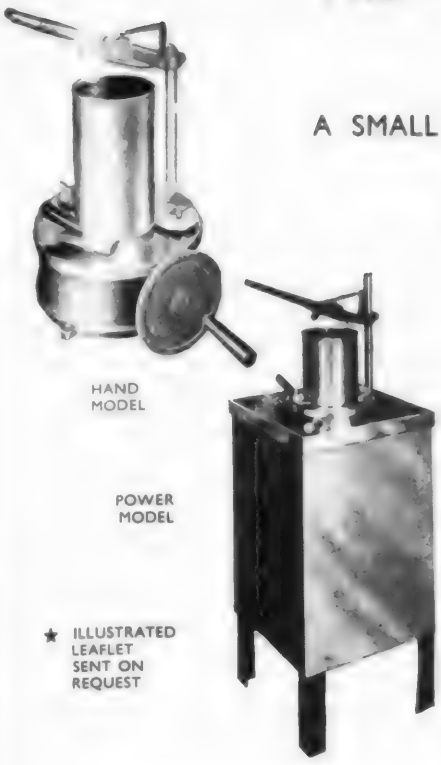
A SMALL MACHINE THAT SOLVES A BIG PROBLEM

IT CLEANLY OPENS CANS IN SECONDS
LEAVING NO JAGGED EDGES or METALLIC SLIVERS



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It grips the can with a vice-like grip, cuts out the lid and removes it and any small slivers of metal by magnetism. A special attachment is available for removing the bottom of the can in preparation for baling.

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The design incorporates a conveyor belt principle enabling all types of paste to be handled at a speed greatly exceeding that of the fixed table type.

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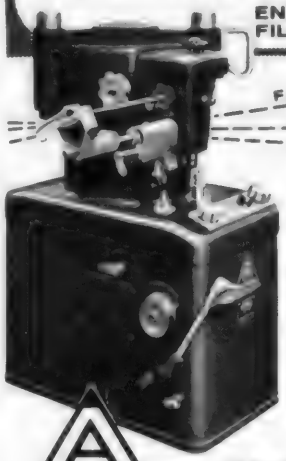
FAST OPERATION
ACCURATE WEIGHING
NO WASTAGE



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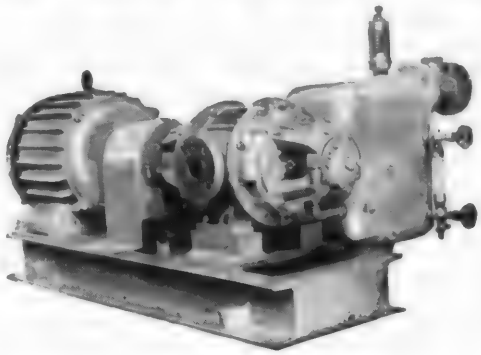

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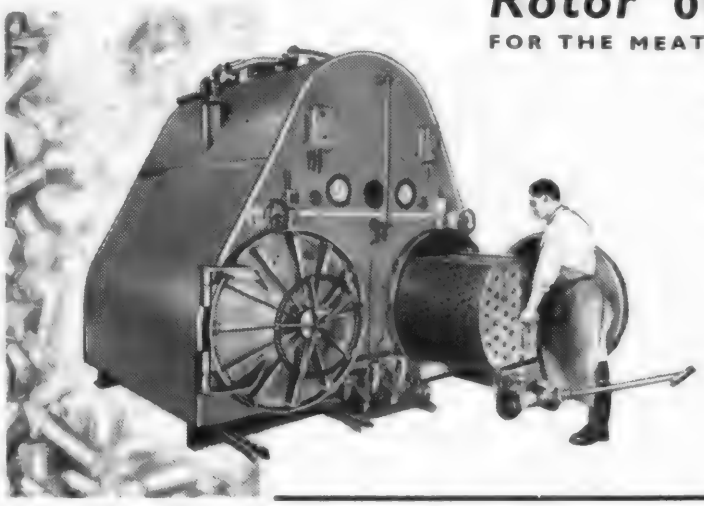

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ADVANTAGES:

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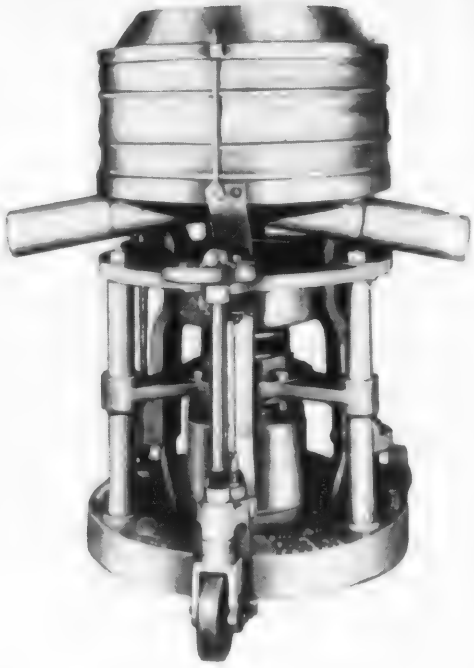

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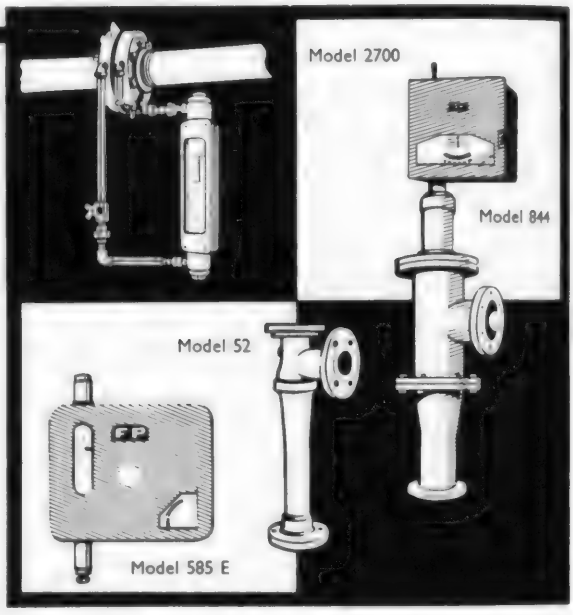

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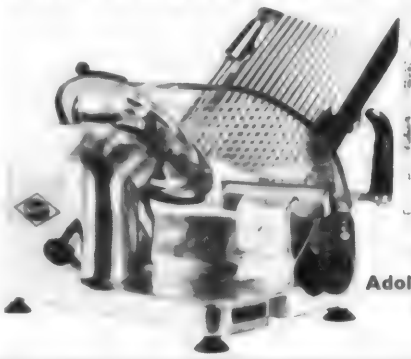

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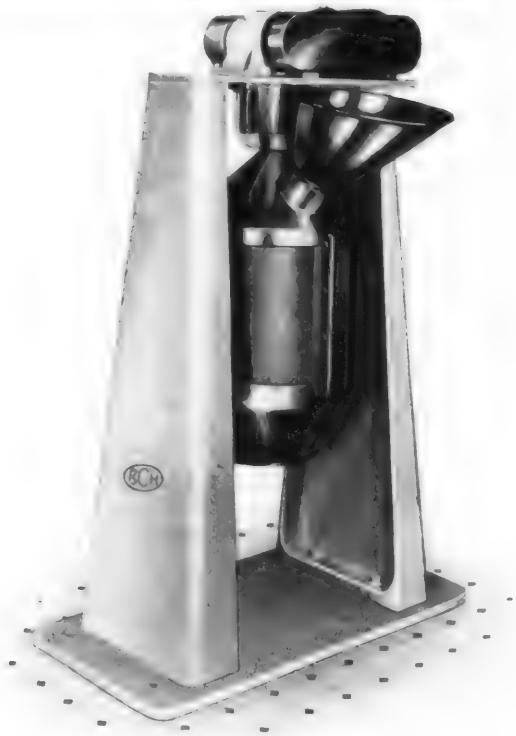

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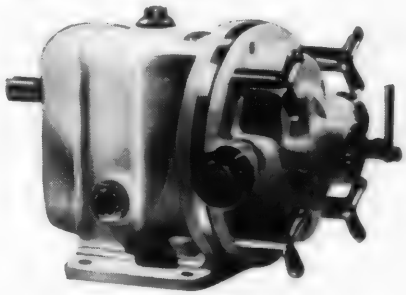

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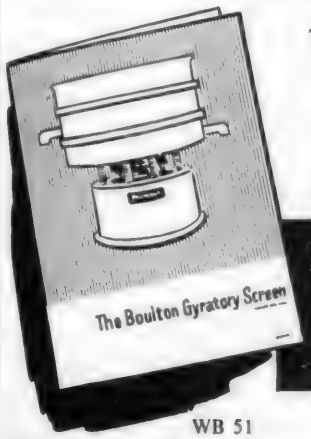

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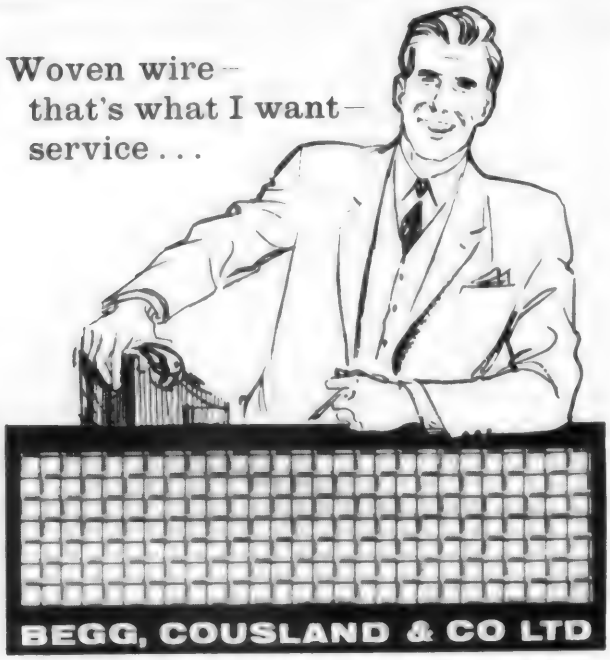

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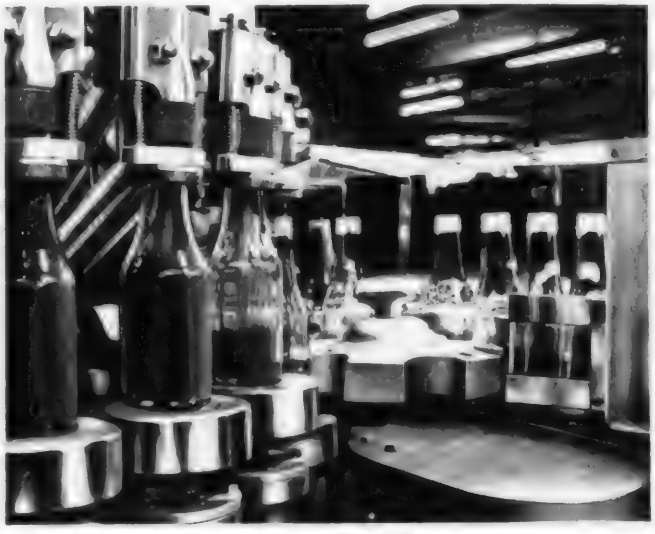

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SONS & CO. LTD.

WOOD LANE, LONDON W.12.

Tel.: Shepherds Bush 2070

CHAMPION BAKERIES

NEWCASTLE, STAFFORDSHIRE

Announce that vacancies occur for the following:

FOOD CHEMIST

for senior position in new department which will work closely with Production and Quality Control Departments. Applicants should have some knowledge of flour and cake ingredient testing.

As the new department will be embracing responsibility in the maintenance of high standards of hygiene, some knowledge of microbiology is desirable.

PRODUCTION MANAGER

to take charge of semi-automtaic Cake Bakery. Detailed knowledge of baking is secondary in importance to outstanding ability and interest in flow production, staff control, and the maintenance of good consistent standard of product, given help and guidance of practical bakers in our Department and Quality Control Departments. Accommodation available.

Both these positions carry good salaries and successful candidates will be working in modern factories with the support of an enthusiastic Management Team. Applications will be treated in the strictest confidence and should contain fullest possible details of candidate's personal background, education, positions held to date, age, any qualifications, etc., and should be addressed to the Secretary, Birkett & Roberts Ltd., Champion Bakeries, Newcastle, Staffordshire.

BUSINESS OPPORTUNITIES

DAMAGED or redundant stocks of food, residues or by-products in large or small quantities required.—Send your offers to Rotunda Foods Co., London Office: 50/52, Blandford Street, W.1. Tel.: Welbeck 8465.

"FRIGIDAIRE" Low Temperature Refrigerators, 49 in. w. by 28 in. d. by 34 in. h. ext Ex large National user, suitable A.C. or D.C. deep freezing, storage of ice cream, frozen foods, etc. Price £40 each. Domestic Refrigerators, Service Cabinets and Cold Rooms also available.—A.R.C., 134, Great Portland Street, London, W.1. Tel.: MUSeum 4480.

COMPANY with long experience of production and marketing in proprietary field can now consider the purchase outright of one other business of similar character. Products may be any category of foods or confectionery; or pharmaceutical, toilet or cosmetic. Negotiations will be searching and conducted at professional level. Company in Lancashire or Yorkshire preferred, but not essential.—All correspondence treated with utmost confidence, and in first instance should outline history, present position and financial aspects, to Managing Director, Box B5961, *Food Manufacture*, 9, Eden Street, London, N.W.1.

DRAKESONS
(GENERAL METAL SPINNERS) LIMITED
CAPACITY UP TO 72" IN ALL METALS
SPECIALISTS IN HEAVY GAUGE HYDRAULIC POWER SPINNING
SHEET METAL ENGINEERS
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SECOND-HAND PLANT FOR SALE

FOR re-built Refrigeration Equipment, all types and sizes, try Alfred's Ices (1954) Ltd., 1-5, Hall Place, Paddington, W.2. Tel.: PADdington 6619/10.

ROSS Diesel Forklift Truck. Heavy duty. 6,000 lb. capacity. 17 ft. 6 in. lift. Perkins P3 Diesel engine. Twin pneumatic tyres. In excellent condition throughout. Open to engineer's inspection and insurance survey. Ready for immediate operation. £1,250.—Speed Electrics, Dept. FM., Church Street, Basford, Nottingham. Tel.: 75716.

CONVEYANCER Petrol/Electric Forklift Truck. 4,000 lb. capacity. 12 ft. lift. Two sets of forks, 2 ft. 6 in., and 6 ft. for bulk handling. Set of brand new solid rubber tyres. £595.—Speed Electrics, Dept. FM., Church Street, Basford, Nottingham. Tel.: 75716.

B.C.H., 40 gal. tilting stainless steel jacketed Pan, 100 lb. steam working pressure. Beth Automatic Can Labelling Machine. Pelkman Morton 50 gal. Cream Mixing and Whisking Machine.—Details from C. Skerman and Sons Ltd., 118, Putney Bridge Road, S.W.15. Tel.: VANdyke 2406.

WANTED
DIESEL GENERATING SETS, DIESEL ENGINES AND MARINE ENGINES
from 30-2,000 h.p. Immediate cash settlement.
Particulars to:
D. ARNOLD,
Feltham Road, Ashford, Middlesex.
Telephone: Ashford 3349

The Strongest Vanilla Flavour
VANOLEUM
1 oz. (2/6) makes a pint of essence
4 ozs. 8/6 ½ lb. 16/6. 1 lb. 32/-
For further details apply:
ARTHUR WHITTAKER & CO. LTD.
30 Church St., Newton Heath, Manchester, 10

WANTED

FATS and Oils (vegetable), surplus, purchased by L. R. Stevens, "Stella Maris," Dirtham Lane, Effingham, Surrey. Tel.: East Horsley 3220.

STORAGE

FIRST-CLASS Storage Accommodation available at Witham, Essex. New steel and concrete building, size 100 ft. by 30 ft. by 15 ft. providing very dry storage; three more buildings to be constructed shortly on same site; easy access to and from main A12 road to the East Coast; within three minutes of main line railway station. Road haulage firm on adjacent site. Ideal Storage Centre for Food Manufacturer. Enquiries invited.—Arnold Kahn, Maldon Road, Witham, Essex. Tel.: Witham 3140.

. . . for certain results it's best to use the classified columns of this journal . . .

BIRDS EYE
QUICK-FROZEN FOODS

BIRDS EYE FOODS LIMITED

A vacancy exists in this rapidly expanding Unilever Company for a

COMPANY PROCESS ENGINEER

for the London Head Office

HIS DUTIES

will be largely of a consulting nature with regard to existing lines, and he will be directly responsible for building up new product lines for installation in five factories. Minimum qualification: Graduate of I.Mech.E. or equivalent. Experience of the food industry is desirable.

This is a permanent superannuated management appointment, and the commencing salary will be not less then £1,500, with excellent promotional prospects.

Applications giving details of qualifications, experience and present salary should be addressed to:

THE PERSONNEL MANAGER
BIRDS EYE FOODS LIMITED
HESKETH HOUSE · PORTMAN SQUARE · LONDON · W.1

SITUATIONS WANTED

AN alert factory manager (40) is willing to accept the appointment as general manager of a sausage, pie and cooked meat manufacturing company that has in view a large expansion programme. Adept in factory and sales (vans and shops) administration, meat and ingredient buying, extra large scale productions under mass and modern conditions, plant layout, quality and stock control, standard and unit costings packaging. A practical business man with full Inst. of Meat technical qualifications. Box B5963, *Food Manufacture*, 9, Eden Street, N.W.1.

FOR SALE

250 gal. stainless steel Tanks, 200 gal. stainless steel Ageing Vat with brine cooling jacket and cooling equipment and compressor, Mono Type H3 F.M.B. st. steel Pumps with trolleys, Alite automatic Filler, Mixers, Kneaders, Dividers, Racks, Provers, Baking Sheets, etc. Your enquiries welcomed. Extended credit facilities with free Life Assurance. Sorensen Bakery Equipment Ltd., 42, Raby Street, Manchester 16. Tel.: Moss Side 2054/4054. Grams: Rahbek.

COUNTER that Rising Cream Cost. "Cream-Master" Cream Whipping Machines will give you a minimum 25% saving and an improved non-weep cream. Let us send you full details. Sorensens, 42, Raby Street, Manchester 16.

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DRIED HERBS
SEEDS & SPICES
GROUND PAPRIKA

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Telex: London 23596

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Vandyke 2406 (5 lines)

PLANT FOR SALE

LIQUIDATION sale modern Hydraulic Presses, Westfalia Clarifier, Fruit Juice Pumps, Pasteurisers, etc. Perfect. –Box B5931, *Food Manufacturer*, 9, Eden Street, N.W.1.

A reconditioned Labelling Machine carrying the maker's guarantee, is a better proposition than second-hand plant. These are available from time to time from Purdy Machinery Co. Ltd., 41-42, Prescot Street, London, E.1.

PHONE 55298 STAINES
Conveyor Packing Table, 27 ft. long by 33 in. wide, 12 in. belt. Belt Conveyors, 33 ft. by 32 in. by 20 ft. by 30 in. wide. Stainless jac. Pans, 40 gal. capacity, 10 w.p. Bowl Mixers (3-speed elec.), 20, 40 and 80 quart. Stainless cyl. enc. 850 gal. Tank. Glass-lined Tanks, 800, 1,000, 1,500, 2,000 and 9,000 gal. Unused elec. Stirrers, ½ h.p. 400/3/50, 350 r.p.m. Vert. Cooking Retorts, 4 ft. 6 in. by 3 ft. 4 in. diam., 25 w.p. Galv. Trough Conveyor, worm 8 in. diam. by 50 ft. long. Stainless steel Bain Maries, 4 ft. 6 in. by 3 ft. by 10 in., A.C. Cooking Retorts, 6 ft. by 3 ft. by 3 ft., 15 lb. w.p. Gunmetal "Z" Mixers, 29 in. by 29 in. by 22 in. and 21 in. by 21 in. by 18 in. "U" Trough Mixers, up to 9 ft. 6 in. by 4 ft. by 4 ft. Cyl. jac. Mixing Pans up to 2,000 gal. Pumps, Hydros, Disintegrators, Refiners, Crushers, Condensers, Ball Mills, Filter Presses, etc. Stock Lists available.–Harry H. Gardam and Co. Ltd., 100, Church Street, Staines.

PREMIER Filterpress, Model ES/4 Semi-auto Vacuum Double Seaming Machine for sale. Stationary type with four-roller head. At present fitted with No. 1 vacuum sleeve approximately 4 in. diam. by 8 in. high. With No. 2 vacuum sleeve approximately 6½ in. diam. by 8 in. high. Speeds up to 1,200 cans per hour. Motor drive 400/440/3/50.—F. J. Edwards Ltd., 359, Euston Road, London, N.W.1, or 41, Water Street, Birmingham 3.

THREE Forgrove, Type 60B, Margarine Moulding and Wrapping Machines, Baker Perkins manufacture, approximately 10 years old and in fair condition.—For further details and permit-to-view, please contact Box B5960, *Food Manufacture*, 9, Eden Street, London, N.W.1.

FOUR large 16 s.w.g. stainless steel Bowls, 3 ft. 10 in. diam., 17 in. deep, with or without stainless steel wire mesh grids. Three open top square 17 s.w.g. stainless steel Tanks, 3 ft. 10 in. by 4 ft. 6 in. by 12 in. deep with or without stainless steel wire mesh grids.—The Grovesend Fruit Farms Cannery, Colwall, Malvern. Tel.: Colwall 248/9.

ONE Pascall Peg Mill complete with totally enclosed 30 h.p. motor and starter for 400/440/3/50. One Pascall Peg Mill complete. One Gardner Brush Screen Sifter complete with 5 h.p. motor. All in working order. No reasonable offer refused. Seen by appointment at M.M.B. Creamery, Aston Road, Wem, Shropshire. Tel.: Wem 7.

COCHRAN vertical Steam Boiler, 3,050 lb. evaporation and Ditto 1,000 lb. Both 100 lb. pressure, splendid condition. Gravity Roller Conveyors, 14 in. and 18 in. wide, Stands, Curves. Collis Elevating Platform Trolley. Electric Potato Crisping Machine, also 28 lb. Potato Peeler. –Kimmins and Sons, Lyndhurst Road, Worthing.

WANTED

WANTED one or two 200 gal. jacketed EMB Stainless Steel or Glass lined vessels, 14 gauge, dished bottoms with mild steel outer jacket on the body of vessels only, bottom outlet and Stainless Steel cover with hinged centre. Box B5964, *Food Manufacture*, 9, Eden Street, N.W.1.

BUSINESS OPPORTUNITIES

CANNING capacity required for about 3,000 dozen No.1 Talls. South-East England or Midlands. –Write Box B5962, *Food Manufacture*, 9, Eden Street, N.W.1.

PLANT FOR SALE

600

PROCESS PLANT FOR SALE

Horizontal Vacuum Drying Plant by Scott, comprising horizontal cylindrical agitated drier, 23 ft. long by 4 ft. i.d., with top centre-feed inlet and bottom centre outlet with hand-wheel control. Jacket pressure 50 p.s.i., chamber pressure 10 p.s.i., agitation gear, tubular type shaft suitable 10 p.s.i. steam pressure. Drive by 10 h.p. motor through worm reduction gearbox. Including steel feed hopper with dust hood and worm conveyor in bottom, electric vibration unit, vertical inclined steel enclosed belt and bucket elevator, overhead steel holding bin, etc.

Stainless steel Vacuum Plant by Oscar Krenz, comprising vacuum pan, 48 in. by 8 ft. high with sight glass, manhole, vacuum gauge, tester, thermometer, pressure gauge, Calandria 48 in. diam. by 27 in. face to face with 192 2½ in. o.d. stainless steel tubes. Vacuum pan with conical bottom with 3 in. outlet connections, etc.

Vacuum Oven by Francis Shaw, mild steel welded construction, 5 ft. 2 in. wide by 8 ft. 9 in. long by 7 ft. high internally, heavy cast iron swing door each end with four corner wheel operated swing clamps, sight glasses, lamps and aircocks. Top and bottom flanged connections to internal headers with swan neck connections to 17 steam heated platens of welded construction 1½ in. thick, suitable 40 p.s.i. s.w.p. Daylight 3¾ in., effective platen width 60¾ in. THREE AVAILABLE.

TWIN-ROLL BUFLOVAK DRIER by Consolidated Products, U.S.A., 100 in. by 32 in., type 700 serial, rolls suitable 100 p.s.i. w.p. Driven through enclosed chains, reduction gear and vee ropes by 5 h.p. 400/3/50 cycles motor. TWO AVAILABLE.

Horizontal Twin-roll Drier by Goudsche of Gouda, twin rolls approx. 6 ft. 8 in. by 2 ft. 8 in. suitable 80 p.s.i. w.p. Belt driven. With hood and chimney, knife holders and knives, condensate discharge apparatus, safety valve, etc. TWO AVAILABLE.

Rotary Louvre Drier by Dunford and Elliott, mild steel shell, 6 ft. by 1 ft. 6 in., chain drive through reduction gearbox. With Cyclone cast iron motor driven paddle-type extraction fan, mild steel combustion chamber fitted Urquhart oil burner, 12 in. diam. hot air circulation fan.

Sifter/Mixer by Tattersall, trough 8 ft. long by 2 ft. 6 in. wide by 3 ft. 4 in. deep with lever operated slide discharge with bagging outlet. Mild steel construction, internal heat scroll agitator. Main drive through spur gears and countershaft fitted f. and l. pulleys.

Horizontal Powder Mixer by Gardner, 300 lb. capacity, size GG, mild steel trough 5 ft. by 18 in. by 23 in. deep with safety grill, hinged lid and bottom end slide outlet. Removable broken scroll agitator driven by 2 h.p. 400/440/3/50 cycles motor, enclosed in end support pedestal with built-in push button starter.

Horizontal totally enclosed stainless steel Pressure/Storage Vessel by E.M.P., 600 gal. capacity, 5 ft. i.d. by 6 ft. on straight with 8 in. deep dished ends, fabricated 10 SWG material, 25 p.s.i. w.p. Fitted oval inter external manway, centre and top connections, bottom front outlet with valve, pressure gauge, safety valve, thermometer, etc. TWO AVAILABLE.

Vertical totally enclosed jacketed stainless steel Vessel by Metal Propellors, 100 gal. capacity, 2 ft. 6 in. diam. by 3 ft. on straight, dished top fitted 1½ in. diam. inlet connection, dished bottom fitted 24 in. diam. hinged quick release cover with 1½ in. centre outlet, connecting piping to Saunders valve. Welded jacket on sides and top only, flange bolted to base ring, bolts, at 2½ in. p.c.d. Mounted on angle iron stand giving 2 ft. clearance to outlet.

GEORGE COHEN
SONS & CO. LTD.
WOOD LANE, LONDON W.12 Tel.: Shepherds Bush 2070
& STANNINGLEY, Nr. LEEDS
Tel.: Pudsey 2241

I.S.I.S. Appointments Register

Licensed annually by the L.C.C.

9, Eden Street, London, N.W.1. EUSton 5911.

I.S.I.S. is an organisation backed by a large industrial group of consultants with contacts in all the industries based on technology. As an addition to their present resources they have established this Appointments Register. Below will be found some of those technologists who are looking for further opportunities. Employers and Personnel Officers are invited to complete the form below, detach and send to the above address. In this particular instance the use of a form, with its attendant simplification of office systems, ensures speedier results for the employer.

Ref. A.362. British. Male. Married. Age 35. A.M.I.B.A.E., Exemptions A. and B. (A.M.I.Mech.E. and A.M.I.E.E.). 2 years Experimental Officer, agricultural machinery research. 3 years Area Supervisor, tropical agriculture. 3 years Development Engineer, agricultural machinery. 3 years Area Manager, hydraulic hose manufacturers. At present Project Engineer. (Sales), hydraulic and pneumatic hose fittings. Seeks post London or Home Counties, Sales Manager (Engineering), Technical Sales or Development. Salary £1,500 p.a. min.

Ref. A.363. British. Male. Married. Age 37. A.M.I.Mech.E. and very good knowledge of Electrical Engineering Automobile Engineer. 3 years Manager of workshops, oil company. 10 years Manager and later, automobile engineering., and transport, sales, etc. At present Manager, transport, sales side, engineering side and planning of transport. Seeks post as Transport Manager, preference. S. America or would consider Africa. Salary £2,500 p.a. approximately.

Ref. A.364. British. Male. Married. Age 30 M. of Office Managers Assoc. Exempt from Inter. Exam. of Inst. of Commerce, Soc. of Commercial Accountants and Intermediate Accountants. Studying at present for Chartered Inst. of Secretaries. 6 years Regular Army, terminating as Unit Accountant. 2 years Civilian Accountant to association. 2 years Office Manager and Accountant to engineering company. At present Assistant to Company Secretary and Sales Office Manager, engaged in sales of hand tools and workshop accessories by direct sale and mail order, exporting throughout the world. Seeks appointment as Office Manager/Company Secretary. Consider anywhere. Salary £850 p.a. min.

Ref. A.365. British. Single. Age 33. Male. B.Sc. (Agric.) Subsid. Statistics, Economics, Field Experimentation, Zoology, Dip.Ag. 2 years Stockman. 1 year Farm Hand. 3½ years Political Security Officer (Army). 6 years Senior Scientific Officer (advisory, research and administration) agricultural Silvicultural research station. Seeks post as Scientific Adviser, Principal Scientific Officer or Executive Director of Research, S.E. England, Home Counties prefered. Salary £2,000 p.a.

Ref. A.366. British. Male. Married. Age 27. H.N.C.(Mech.), G.I.Mech.E. 5 years Apprentice Fitter and Turner, collapsible tubes and metal foil. 2 years Inst.Mech.(Army). 3 years Stress and Development. Engineer, aircraft components. At present Development Engineer, powder metallurgy. Seeks post as Mechanical Development Engineer, S.E. Essex or East London. Salary £1,200 p.a. minimum.

Ref. A.368. British. Male. Single. Age 38. O.N.C. Elec. Engg. H.N.C. Mech. Engg. A.M.I.Mech.E. 1 year Junior Draughtsman, cement manufacturers. 5 years Senior Draughtsman, cement manufacturers. 1 year Drawing Office Manager, 1 year Mechanical Engineer. i/c of erection and 1½ years Assistant Manager Works Engineer, overseas branch of cement manufacturers. 2 years Resident Engineer, U. K. cement manufacturers and 1½ years abroad as Constructional Engineer, cement manufacturers. Seeks appointment as Project Engineer, London or S. England. Salary £1,600 p.a.

Ref. A.369. British. Male. Married. Age 39. H.N.C. Elect. (Eng.), Corp.M.Inst.Eng. Designers. 5 years Apprentice, electrical power plant. 2 years Design Draughtsman, electrical power plant. 6 years Senior Draughtsman, distribution of electricity. 2 years Senior Draughtsman, 1 year Operations Engineer and 2 years Efficiency and Test Engineer, generation of electricity. At present Power Plant Efficiency and Test Engineer, including acceptance and routine testing of Turbine and Boiler Plant, and development of Boiler Monitoring Equipment. Seeks post as Design Engineer, London or Surrey. Salary £1,200 p.a.

Ref. A.372. 1 year Laboratory Assistant, resin manufacturers. 3 years Research Assistant, paint manufacturers. 2 years Assistant Plant Manager and 4 years Plant Manager, resin manufacturers. 1½ years Assistant Chemist, flooring finish manfacturers Experience includes work with many types of speciality resins. Used to maintaining instruments and has experience in plant layout and installation. Seeks post as Works Manager, Chemist or Assistant London or S. England. Salary £950-£1,050 p.a.

Ref. A.373. British. Female. Age 21. G.C.E., 2 years Laboratory Technician, medical laboratory. 1½ years Laboratory Technician, hospitals. 6 months Laboratory Assistant, enamelling plant. Seeks post as Laboratory Technician, in London, preference S.W. London. Salary £400 p.a.

Ref. A.375. Spanish. Male. Married. Age 40. Doctor in Chemistry 3 years Pure Chemistry Research, council of scientific research. 10 years Paint Chemist, then Technical Director, paint manufacturers. Seeks post as Paint Chemist, Europe or S. America or would consider anywhere. Salary £1,000 p.a. minimum.

Ref. A.376. British. Male. Married. Age 42. 5 years Apprentice, watch and clock maker. 2 years Fitter and Turner, Instrument fitters and turners. 1½ years Instrument Maker, instrument manufacturers. 4½years Engine Room Artificer. R.N. 16 years Experimental instrument maker, electricity meter manufacturers. Seeks post as Instrument Maker, South Coast of England, or near.

Ref. A.377. British. Male. Single. Age 19. 'A' level Physics, Chemistry and Zoology. At present Biochemical Assistant, antibiotics division of research and developement department. Seeks post as Biochemical or Physiological Assistant, preferably in Scandinavian Chemical company, or alternatively in London.

Ref. A.378. British. Male. Age 22. Single O.N.C. Instrument Engg. At present stndying for final year H.N.C. 5½ years Apprentice, instrument manufacturer. At present Assistant Development Engineer, industrial instrument manufacturer. Seeks Technical appointment, preferably application work in instrument engineering. London. Salary £750 p.a.

Ref. A.379. British. Male. Age 30. O.N.C.Chem., H.N.C. I. Chem. Studying for H.N.C. II Chem. 6 months Laboratory Assistant, soap manufacturers. 1½ years Draughtsman, water softening. 1 year Draughtsman, Designers, ore recovery plants, etc. 5 years Laboratory Assistant, gas, coal and coke. Seeks post offering opportunity to gain experience in Chemistry and eventually to specialise. London or Essex. Salary £800 p.a.

Ref. A.381. British. Male. Married. Age 36. B.Sc.(Engg.) A.M.I.E.E. 3 years Audit Clerk. Accountant. 5 years Pilot, R.A.F., 3 months Laboratory Assistant. 6 months Vacation apprenticeship, mechanical and electrical manufacturers. 6 years Technical Sales, electrical manufacturers. At present Electrical Engineer—Contracts and Inspection, consulting and inspecting engineers. Wide experience heavy electrical plant U.K. and Continent, including transformers, rectifiers, switchgear motors. Seeks appointment with prospects of advancement. London. Salary £1,600 p.a.

Ref. A.382. British. Male. Single. Age 52. Study to B.Sc. Level. (Europe). 1 year Chief Chemist, aero-engine factory. 3 years Senior Research Chemist, steelworks. 2 years Consultant to laboratories, aero-engineering, factory, abroad. 10 years Assistant Research Manager, steelworks. Knowledge of French Chief interests:—Spectroscopy, X-ray diffraction. Development of new alloy steels for nuclear reactors. Member of Committee of Research Association. Seeks post as Laboratory Manager, Spectroscopist, or Metallurgical Chemist, London (or near) or France. Salary £1,500 p.a. approx.

(Continued overleaf

To: I.S.I.S. Appointments Register, 9, Eden Street, London, N.W.1. Please ask the following applicants to communicate with the undersigned:

Ref.:	**Ref.:**	**Ref.:**	**Ref.:** .....
Ref.:	**Ref.:**	**Ref.:**	**Ref.:** .....
Ref.:	**Ref.:**	**Ref.:**	**Ref.:** .....

Please use Block capitals

Name: .....

Position: .....

Company: .....

Business or Profession: .....

Address: .....

All introductions are made on the understanding that should an engagement result the employer agrees to I.S.I.S. Appointments Register's terms, which are as follows:

For each person engaged the equivalent of one weeks salary payable by the employer within fourteen days of the date of engagement.

Signature ..... Date .....

I.S.I.S. APPOINTMENTS REGISTER (Continued from overleaf)

Ref. A.383. British. Single. Age 31. B.Sc.Inter. 1 year assistant Experimental Officer, ministry. 2 years Development Chemist, Rubber adhesives. 5 years Chief Chemist, Food Manufacturers. Seeks appointment as Chemist or any type of work in chemistry, food technology or production management work on food or related products. London. Salary £1,000 p.a.

Ref. A.384. British. Male. Married. Age 29. Studied to degree level, via Inter.B.Sc., and for A.R.I.C. Exam. 8 years Assistant Chemist, manufacturing metallurgists. At present Technical Assistant—development and research—electrical engineers. Good knowledge of materials and applications and preparation of reports and summaries. Primarily interested in Technical Sales/Service/Advisory post or liaison between technical-commercial function, but will consider any post with good management prospects. London preference, but Essex/East Anglia or Home Counties considered. Salary for static post in London £1,100 p.a.

Ref. A.385. British. Male. Married. Age 36. C. and G. (Electrical Installation and Full Technical Certificate). 3 years Apprentice, engineers department hospital. 6 months Improver, civil contractors. 4 years Electrical Maintenance, cable makers and electrical engineers. 4 years in charge of Electrical Maintenance, fertilizer factory. 9 years in charge Electrical Engineering Plant, timber merchants. Experience includes fractional to 100 H.P. drives—switchgear and motor overhauls and rewinds, electro-thermal installations, overhead cranes and lifts. Seeks post as Supervisor (Electrical Plant Maintenance). London or West Country. Salary £800-£1,000 p.a.

Ref. A.386. Swiss. Male. Married. Age 30. 1st Class Motor Certificate. 7 years Apprentice Fitter, medium light general engineering. 1 year Junior Fitter, steam turbine and alternator builders. 6 months, Fitter, iron foundry and mechanical workshops. 4 years, Junior—4th—3rd Engineer, shipping co. 2 years. 2nd engineer, shipping co. At present Marine Engineer, shipping co. Languages: English, French and German. Seeks post as Test or Plant Maintenance Engineer. London, S.England or Switzerland. Slary £800-£1,000 p.a.

Ref. A.387. Indian. Male. Single Age 24. Bachelor of Mechanical Engg. 1 year Technical Assistant, Steel Production 3 months Maintenance Engineer, fine chemicals manufacturer. At present Design Engineer, Institute for industrial research in India concerned with design and execution of chemical plants. Seeks appointment as Designer, or would start as apprentice, preferably U.K., but would also consider Canada or Europe.

Ref. A.388. British. Male. Married. Age 39. B.Sc. Special Chemistry, Germany, Ancillary Mathematics, Physics and Geology, B.Sc. Special Chemistry Practical Organic and Inorganic Chemistry Finals. Also qualified as "Technologist in Industrial Chemistry", Argentina, equivalent to British degree. 6 months Analytical Chemist, Factory, Ministry of Supply, analysis of guncotton, nitroglycerine and cordite. 2 years Senior Research Officer, Petroleum warfare department, research on flamethrowers and working on rheology of visco-elastic fluids and fluid flow calculations. 2 years Chief Chemist cereal, breakfast foods and sugar confectionery. 9 years Deputy Chief Chemist, cigarette and tobacco manufacturers. 3 years Chief Chemist/Ink Plant Manager, ball point pens, propelling pencils, inks. 6 months Senior Research Chemist, printing ink manufacturers. Seeks Scientific-managerial appointment, preferably London, but would consider provinces or abroad. Salary £1,700 p.a.

Ref. A.391. British. Male. Single. Age 28. B.Sc. (Chemistry, Physics, Pure Mathematics). 9 months Laboratory Technician, geriatric research laboratory. 3 years Assistant Chemist, gas board laboratory. 6 months Assistant Chemist, manufacturers of gas and electrical cookers, fires and convector heaters. Seeks appointment on Laboratory Staff, Manchester or Newcastle-upon-Tyne. Salary £820 p.a.

Ref. A.392. British, Male. Single, Age 47. 17 years employment with rubber manufacturing company, progressing to General Manager. 5 years Rubber Chemist/Technologist, rubber manufacturers. At present Chief Chemist, rubber manufacturers. Seeks post London or Home Counties as Rubber Technologist. Salary £1,000 p.a.

Ref. A.393. British. Male. Single. Age 44. A.M.Inst.Fuel., A.M.Inst. of British Engrs., A.M. Assoc. of Supervising Elec. Engrs., F.Inst. of Mechanics, M.Inst. of Automation, F.Inst. of Engrs. 5 years apprentice fitter and turners. 2 years own company of automobile and general engineers. 4 years Foreman Engineer, food manufacturers, 9 months Foreman Development Engineer, fur dressers and dyers. 2 years Works Foreman, safety equipment. 5 years Chief Engineer, hospitals. At present Chief Engineer, electrical accessories and plastic components. Seeks appointment as Chief Engr./Works Engr./Works Manager, London area. Salary £1,500 p.a.

Ref. A.394. British. Male. Married. Age 52. B.Sc., F.R.I.C., 17 years Works Chemist, domestic appliance manufacturer. Established Chemical Laboratory for control of materials and processes used in manufacture of refrigerators, water softeners and vacuum cleaners. 2½ years Technical Representative, and 5½ years Technical Research Manager, paint manufacturers. At present Senior Chemist in charge of Paints Section of transport organisation, including control and application of industrial, transport and decorative and protective finishes. Seeks Senior Chemical position or Technical Sales and Liaison appointment. London. Salary £1,800 p.a.

Ref. A.395. British. Male. Married. Age 30. 6½ years Experience as Buyer of engineering equipment and stores, purchasing wide range of engineering materials for London agents of African and Far East industrial undertakings. Seeks appointment as Buyer, preferably London but other areas considered. Salary £950 p.a. min.

Ref. A.398. British. Male. Married. Age 36. Studied to B.Sc. Chemistry, with Mathematics. A.R.I.C., Ass. Plastics Inst. 4 years Senior Chemist, large engineering group. 4 years Chief Chemist, plastics. 6 years Chief Chemist, food industry. Experienced in production control development and research. Wide chemical processing knowledge, food technology, radio, paint, plastics, rubbers, textiles and metal finishing. Seeks appointment as Technical/Development Manager or Technical/Commercial Executive, England, N. Europe or Australasia. Salary £1,800-£2,000 p.a.

Ref. A.400. British. Male. Married. Age 37. Hons. Diploma of College of Aeronautical and Automobile Engg. 1 year Technical Author, aircraft publications. 1 year Assistant Publicity Manager, aircraft accessories manufacturer. 1 year Chief Engineer, flying club. 4 years Technical Author, aircraft manufacturers. 8 years Technical Author, aircraft research. Experienced as free-lance journalist in motor sporting field. Seeks appointment, possibly as Public Relations Officer, in motor, aircraft or component company. London or Provinces. Salary £1,250 p.a.

Ref. A.402. British. Male. Married. Age 39. H.N.C., A.M.I.C.E. Experience: 5 years Assistant Engineer, mining and pulp and paper manufacturer. 6 years Project Engineer, chemical plastics, plant consultants. At present Senior Projects Engineer, chemical and mechanical handling plant manufacturers. Seeks Management appointment in London. Salary £1,500 p.a. min.

Ref. A.403. British. Male. Married. Age 45. Assoc.M.Inst. of Elec. Engrs. 2 years Student Apprenticeship, engineering. 1 year Junior Test Engineer, transformers. 1½ years Junior Control Room Engineer, power station. 2 years Technical Sales Engineer, handling tenders for wide range of power transformers. 4½ years Specialist Sales Engineer, manufacturers of fractional horsepower motors. 4½ years self-employed as Electrical Contractor/Retailer. 1½ years Specialist Sales Engineer, manufacturers of rotating machines, transformers and switchgear. 2½ years Technical Sales Engineer, handling tenders and contracts for all non-standard Diesel generating plants for export. Seeks post as Sales Engineer (outside) or as member of Management Consultancy Company. Midlands or S.W. England. Salary £1,100 p.a.

Ref. A.404. British. Male. Married. Age 64. Experience: 6 years Civil Engineer, oil company, 4½ years Civil Engineer, contractors. 16 years Civil Engineer, petroleum company, 2 years Building Inspector, development board. 3 years Chief Engineer, contractors. Experience covers civil engineering construction in brick, stone, steel, reinforced concrete, drainage and water supply schemes, heavy foundation work, quantities, estimates, preparation of tenders, etc. Seeks appointment as Civil Engineer, Estimator or Quantity Surveyor, Persia, Europe, or elsewhere abroad, except Middle East. Salary £2,500 p.a.

Ref. A.405. British. Male. Married. Age 33. B.Sc. (Civ. Eng.) A.M.I.C.E. Experience: 1½ years Assistant Engineer, sewerage authority. 1½ years Assistant Engineer, and 2 years Senior Engineer, new town development corporation. At present Design Section Leader, civil engineering consultants. Seeks management post in industry as Civil Engineer, but not with contractors or consultants, N. London or Provinces. Salary £1,500 p.a. min.

Ref. A.407. Husband and Wife, age 50. Seeks joint appointment as Warden and Matron of Industrial Hostel. Further details obtainable on application.

Ref. A.408. British. Male. Married. Age 28. Inter B.Sc. (Bot., Zoo., Chem. and Maths.) Zoo. Subsid. B.Sc. C. and G. Milk Processing and Control Final (1st Class). Knowledge Swedish, German and French. 1 year Farm Labourer. 1½ years Farm Foreman. 7 months Transport and General Office experience, prestressed concrete. At present Laboratory Technician, manufacturing dairy. Seeks executive/administrative post, preferably in the dairy or food industry. U.K. or abroad (Sweden preferred). Salary £700/£800 p.a.

Ref. A.409. British. Male. Married. Age 29. Foreman Fitter with 6 years experience in motor cars and bicycles, including re-spraying, seeks post abroad as Fitter.

Ref. A.410. British. Male. Married. Age 38. Member of the Royal Aeronautical Society. 4 years Inspector/Senior Inspector, aircraft constructors. 1 years Senior Liaison Inspector, aircraft constructors. Fully approved member of the A.R.B. & I.F.V. Inspection Directorate. At present Deputy Chief Inspector, moulded plastic manufacturers. Seeks post, U.K. as Deputy or Chief Inspector. Salary £1,200 p.a.

Ref. A.411. British. Male. Married. Age 30. Ord. & Higher Grade Certs. Inst. Gas Engrs., A.M.I.Gas E. 1½ years Laboratory Assistant, 3½ years Technical Assistant (production), 4 years Senior Technical Assistant (development), and 2 years Assistant Engineer (development), gas board. Seeks Development or Research appointment, fuel industry. North England or Wales preferred. Salary £1,200-£1,300 p.a.

Ref. A.412. British. Male. Married. Age 42. 4 years Inspector, sheet metal, electrical company. 2 years Press Shop Supervisor, electrical company. 2 years Works Manager, aircraft company. At present Chief Inspector, temperature measuring instruments. Seeks post as Chief Inspector or Works Manager, London. Salary £1,000 p.a.

Ref. A.413. British. Male. Single. Age 37. C. & G. First-Class Quantities and Estimating. One subject to pass in R.I.C.S. final examination. 5 years Taker-off and 7 years Senior Taker-off, chartered quantity surveyors. Seeks post in London or Kent as Senior Taker-off. Salary £1,350 p.a.

Ref. A.414. British. Male. Married. Age 41. Grad. Chemist, 1st Class Honours. 1 year Trainee Chemist, U.S.A. 9 years Chief Chemist/Technical Director/Managing Director, European manufacturers of paints, varnishes and resins. 1 year Research Chemist, Europe, industrial finishes. 10 years Executive—Technical Manager—Research Chemist, U.K. manufacturers of varnish, paints, emulsions, synthetic resins, floor dressings, polishes. Seeks post as Chief Chemist, Technical Director or General Manager, U.K., South America, Canada or Europe. Salary £1,500 p.a. min. Languages: English German, Czech.

Ref. A.462. Indian. Male. Single. Age 26. B.Sc. (Agric.). At present resident India. 6 months practical training in all the branches of Agriculture at horticultural research station and jute seed multiplication farm. At present employed in directorate of agriculture. Seeks post U.K. or U.S.A. as Apprentice-Trainee, willing to take further training in any branch of Agriculture, preferably in Agronomy, Plant Protection, Dairying or Horticulture.

Ref. A.463. British. Male. Married. Age 41. Inter. Cert. Timber Technology. Inter. Sales Managers Assoc. Exams. 3½ years Trainee Buyer, continental timber importers. 6 months Management Trainee, toy manufacturers. 12½ years Purchasing Assistant/Assistant Purchasing Manager/Planning Manager, electric light fittings, plastic moulders and fabricators, wireworkers. Speaks Russian, Assoc. M. of Purchasing Officers Assoc. Seeks post as Buyer, London or Provinces. Salary £1,200 p.a.

Ref. A.465. British. Male. Married. Age 29. H.N.C. (Mech. Eng.), Grad. I.Mech.E. 2½ years Draughtsman, Boiler Designers and Manufacturers. 1 year Draughtsman, nuclear engineering, oil refinery, chemical plant. 6 months Assistant Engineer, consulting engineers. 2 years Senior Draughtsman, chemical plant, factory plant, ventilating plant. At present Senior Draughtsman Cement and Lime manufacturers. Seeks appointment with Engineer Status. London area. Salary £1,150 p.a. minimum.

Ref. A.466. Indian. Male. Single. Age 28. M.Sc. (Tech.), Applied Chemistry with specilisation in Chem. Engg. 4 months Scientific Assistant, government work. 4 months Chemical Engineering Assistant. 4 years Scientific Officer, fuel research institute. Seeks post U.K., Canada, Australia or U.S.A., as Research Assistant.

Ref. A.467. British. Male. Married. Age 41. A.M.Inst.E., A.M.I.E. (F.R.A.C.). 4 years Workshop Instructor, steam turbine manufacturers. 16 years Fitter and Air Engineer, R.A.F. 4 years General fitting work, bleach and dye works. At present studying for Grad. Exam. of Soc. of Engrs. Seeks suitable post London—or within 30-40 miles radius. Salary £750 p.a.

Ref. A.468. British. Male. Married. Age 35. Dip. Agric., A.I.C.T.A. At present resident Africa. 7 years Agronomist, overseas government, East Indies. 6 years Agronomist, overseas government, Africa. Has current Private Pilot's Licence. Seeks post as Executive/Overseas Representative, abroad.

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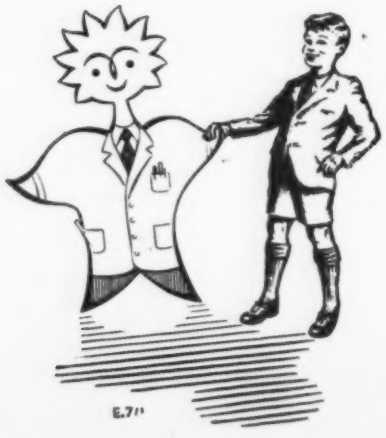

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